TEACHING CHILDREN ABOUT EMOTIONS AND FRIENDS USING A COMPUTER PROGRAM

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Abstract

The purpose of this study was to evaluate the effectiveness of a computer program in conjunction with instruction from the researcher, in helping individuals with Autism Spectrum Disorders improve their emotional and social skills. In an A-B-A with replication across participants design, three participants used the program for 20 minutes a day for 15-18 sessions in a school setting, across six weeks. The researcher provided one on one support to participants while they used the program. The participants were aged 10 to 12 and had previously been diagnosed with Asperger's Syndrome or High-Functioning Autism. Participant's progress was measured by conducting pre-and post intervention interviews with parents and teachers of participants, and the participants themselves. Data was also collected while the participant used the computer program and from the diary entries completed each session. Naturalistic observations were conducted to determine if any effects of the program were generalized. The results demonstrated that participant's emotion recognition improved as shown by an increase in emotion scenarios completed in the computer program. In addition emotion expression skills improved as demonstrated by content of participant's diary entries. An improvement in social skills was also shown by participants becoming more engaged in group activities, physical education and making friends. The results show preliminary evidence for the program, in conjunction with individualized support, being a promising treatment method to teach emotion recognition and social skills. It is unclear how much of an effect the support of the researcher and the diary component, had on participants progress. Future research should focus on making outcomes more consistent and widely generalized. Implications for research, practice and program development are discussed.

CHAPTER 1: INTRODUCTION

Autism is a severe neurodevelopmental disorder that may result in a lifelong disability. Reflecting the heterogeneity of Autism, it is classed as a spectrum disorder and categorized in the DSM-IV-TR as a pervasive developmental disorder (American Psychiatric Association, 2000). Autism spectrum disorder (ASD) is characterized by significant impairments in social and communication skills and stereotyped patterns of interests and behaviours (Landa, 2007). ASD includes pervasive developmental disorder not otherwise specified (PDD-NOS), Asperger syndrome (AS); Rett's syndrome; and childhood disintegrative disorder (CDD). In this thesis High-Functioning Autism (HFA) and AS are of particular interest. Autism is 3-4 times more prevalent in males. The estimate for both sexes is 10-12 per 10,000. The prevalence estimate for children with AS is up to 48 per 10,000 children (Kadesjo & Gillberg, 1999). The prevalence of the entire Autism spectrum is at least 5-6 per 1,000 (Bryson & Smith, 1998). This is concerning as ASD involves many parts of the brain and undermines social development, thereby demonstrating the need for successful interventions targeting this deficit.

High-Functioning Autism and Asperger's Syndrome

The term ASD also incorporates AS, and is therefore included in the spectrum, however it can also be distinguished from Autism. Similar to children with Autism, children with AS have difficulties in social interaction, restricted patterns of behaviour and interests. The defining feature is that they do not have a significant delay in cognitive and language development (American, Psychiatric Association, 2000). As Autism is a spectrum disorder, individuals are labelled as being low, moderate, or high functioning. High-functioning individuals may have the classic

signs of Autism during childhood, however when their cognitive skills are tested, they show a greater intellectual ability, social skills and adaptive behaviour than those who are lower functioning on the spectrum (Attwood, 2003).

A distinguishing feature between HFA and AS is the average age at which individuals are diagnosed. HFA tends to be diagnosed when a child is developmentally delayed in their cognitive abilities. The mean age at diagnosis is 5-years, but some children are diagnosed as early as 18 months old. However children with AS are commonly not diagnosed until they begin school with a mean age of diagnosis being 11-years (Howlin, Mawhood, & Rutter, 2000). It is common for children with AS to have atypical (odd) use of language and clumsiness (Baskin, Sperber, & Price, 2006). Secondly, in distinguishing children with HFA from children with AS, those with HFA will usually have an IQ in the normal range (above 70), whereas children with AS will have an average or above IQ (i.e., 90-110 or above). Children with HFA have lower verbal IQ, higher performance IQ (Ghaziuddin & Mountain-Kimchi, 2004; Ghaziuddin, Weidmer-Mikhail, & Ghaziuddin, 2002). Further differentiating factors are that in comparison so children with AS, children with with HFA also present with less deviating locomotion, are less able to function independently, have more varied interests, people with HFA however children with AS are better at empathising with other individuals (Attwood, 2003; Mazefsky & Oswald, 2007; Rinehart, Bradshaw, & Brereton, 2002). Ozonoff, South, and Miller (2000) compared children with HFA and AS who were matched on age, sex and intellectual ability. Children with AS showed fewer severe symptoms when very young, and a less severe developmental course and consequently a more favourable outcome than the HFA group. The authors summarized that HFA and AS had similar

behaviour profiles and only differed in degree or severity. They therefore suggested that the same treatments are suitable for both disorders.

Neurological Mechanisms of Autism

Social-emotional neural mechanisms. Mirror neuron dysfunction is suggested to be an underlying cause for social-emotional deficits in autism. The pars opercularis situated in the inferior frontal gyrus is used during observation, imitation and in theory of mind tasks. It is understood to work with the limbic system to produce an experience and understanding of others feelings (Minshew & Williams, 2007). The evidence base for mirror neuron dysfunction comes from fMRI, transcranial magnetic stimulation studies, and an electroencephalographic feature named the mu rhythm (Perkins, Stokes, McGillivray, & Bittar, 2010). In electroencephalograph (EEG) a mu wave is blocked when an individual makes voluntary muscle movements e.g., making a fist. Mu waves are also blocked when an individual watches someone else perform the same action due to pre-motor mirror neurons (Oberman & Ramachandran, 2007). Perkins et al. (2010) argued that mirror neuron function could be a neurophysiological marker of Autism.

Amygdala. The amygdala is a small (2.25cm^3) almond-shaped structure located in the anterior region of the temporal lobe. Its role includes regulating emotion and social behaviour. Given this role, it is an area of interest when examining the neuropathology of children with autism. In studies of children enlargement of the amygdala (~15%) is found (Mosconi, Cody-Hazlett, & Poe, 2009; Schumann, 2004; Schumann, Barnes, Lord, & Courchesne, 2009; Sparks, Friedman, Shaw, & Aylward, 2002). Studies using primarily adults or a broad age range of participants report inconsistent results; either no difference in the size of the amygdala compared to controls (Haznedar & Buchsbaum, 2000; Schumann, 2004), or a smaller amygdala

(Aylward, Minshew, Goldstein, & Honeycutt, 1999; Nacewicz, Dalton, & Johnstone, 2006). The amygdala appears, therefore, not to follow the typical growth pattern in children with Autism. This evidence fits with the growth deregulation hypothesis demonstrating increased cell packing density and an increased number of brain neurons (Courchesne, Carper, & Akshoomoff, 2003; Dawson et al., 2007; Dementieva et al., 2005; Hazlett et al., 2005).

Impact on Developmental Domains

Cognitive outcomes. Autism is connected to a variety of cognitive, social and behavioural impairments, and cognitive theories help to explain faults in the mechanisms of the Autistic mind.. Children with Autism have an uneven pattern of intelligence: they have good factual knowledge, rote memory and focused attention to detail but poor common sense comprehension, working memory and strategic task planning (Hill & Frith, 2003).

Weak central coherence. Defined as the tendency to process information in bits and pieces rather than looking at the bigger picture where context is disregarded and is a feature of Autism (Frith, 1989). A test illustrating this is the Block Design task (Kohs, 1923), where children are timed using red and white squares to form a reference pattern. Children with autism outperform typically developing children in this task (Shah & Frith, 1993). This is evidence for weak central coherence as the children with autism are more able to mentally segment a whole design (i.e., they are better able to process information in bits and pieces).

The effects of weak central coherence can be detrimental. Typically developing individuals report the gist of a story rather than details and are able to generalize stimuli over a range of contexts (Bartlett, 1995), children with Autism typically recall exact words of a story rather than the gist. They also have difficulty when the same

stimulus has to be interpreted differently according to context e.g., disambiguating homographs (i.e., words with different pronunciations or meanings) when reading sentences aloud (Happé, 1997). These faults may lead to difficulties in social interaction because of a failure to correctly process information from different sources in the correct context. The extent to which weak central coherence can account for the behaviours of children with Autism is limited and may be better explained by executive dysfunction.

Theory of mind. This is a fault in features of the social brain that impairs ability to understand aspects of communication. Individuals with Autism are reported to have an absence of theory of mind and this explains many of the social and communication impairments in Autism. This means they have a deficit in acknowledging that behaviour can be understood through mental states (e.g., desires, belief and knowledge). This ability to make connections between external behaviours and internal states of mind is often referred to in the literature as 'mentalizing'. In the most severe cases there is no understanding of mental states at all, and in the mildest, compensatory learning can lead to the acquisition of a theory of mind and being able to attribute and manipulate mental states.

The following example illustrates the idea that individuals with Autism fail to metalize. The classic Sally-Ann task measures an individual's social cognitive ability to take on another individuals perspective (a false belief) (Baron-Cohen, Leslie, & Frith, 1985). Typically developing 4-year-old children pass the test, whereas 80% of children with Autism with a mental age of 4 years and over fail and cannot pass this task until their verbal mental age is at least 8 years. Tager-Flusberg, Joseph, and Folstein (2001) state that some individuals can pass this test but that they still lack a mentalizing ability in communication. Performance here is closely related to language

ability, particularly knowledge of complete syntax. Therefore failure in theory of mind tasks may be a consequence of impairments in linguistic knowledge. It is also said to be a result of deficits in executive functions as theory of mind tasks involve action monitoring and self-regulation.

Executive dysfunction. This is a deficit in higher-order planning and regulatory behaviours (e.g., planning and organizing, processing information in novel and unpredictable environments and disengaging from salient stimuli). Executive functions permits individuals to maintain effective problem solving by inhibiting inappropriate behaviours, engaging in thoughtful actions and flexibly shifting from one task to another (Sanders, Johnson, Garavan, Gill, & Gallagher, 2008). Deficits in this ability can be explained by the absence of top-down control, which impairs the organization of behaviours, which are not routine in individuals with Autism. Without the supervisory role of the central executive, repetitive and rigid behaviours are inevitable. Such problems may explain stereotyped behaviour and the narrow interests typical of Autism (Hill & Frith, 2003).

Emotional and behavioural adjustment outcomes. It is well evidenced that individuals with AS have a greater prevalence mood disorders, namely anxiety and depression (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Sofronoff, Attwood, & Hinton, 2005). It is estimated that at least 40% of those diagnosed through the Autism Diagnostic Interview-Revised have experienced an episode of a psychological disorder (Bryson & Smith, 1998). Individuals with Autism have been observed to have trouble letting go of thoughts and emotional distress associated with stressful events (Bryson & Smith, 1998). Individuals with AS also display greater amounts of depressive symptoms than the general population (Ghaziuddin et al., 2002). A study interviewing 35 adolescents/adults with AS found that 13 of them (35%) met criteria

for a co-morbid diagnosis of depression (8 major depression, 4 dysthymia, and 1 with bipolar disorder) (Ghaziuddin et al., 2002).

Using parent report as their method, Kim et al. (2000) compared prevalence of mood disorders and anxiety in children with HFA and AS with a community sample. Prevalence of mood disorders and anxiety were greater in children with HFA and AS. Depressive symptoms were present in 16.9% (at two standard deviations above the general population mean), 13.6% had generalized anxiety and 8.5% separation anxiety. Children with anxiety and mood problems also tended to be rated as having higher levels of aggression, being demanding and having worse relationships with their peers and teachers. Further evidence for elevated anxiety in adolescents with AS was found in a study by Green, Gilchrist, Burton, and Cox (2000), who compared an AS group to a group with conduct disorder. Children with AS had significantly higher levels of anxiety including symptoms of hypochondriasis, non-situational anxiety or panic, and specific fears.

Loneliness is a possible cause for depression in ASD's (Parker & Asher, 1993). If there is a difference between the quantity and quality of the friendships that an individual wants and what they actually have, then this is expressed as loneliness (Cassidy & Asher, 1992). Whitehouse, Durkin, and Jaquet (2009), examined the connection between friendship and negative affect in adolescents with AS. This research involved 35 participants with AS matched with 35 control adolescents (*M* age = 14). Participants with AS, had lower quality best friendships and less motivation for developing friendships as measured by questionnaires than the control group. Those with AS also demonstrated greater rates of loneliness and depressive symptoms. Their rates of loneliness were correlated with the quality of their relationship with their best friend. The greater rate of loneliness in participants with

AS was also predicted by high levels of conflict and betrayal in their friendship as measured by the friendship quality questionnaire (Parker & Asher, 1993). There are also findings that social skill is associated with low mood in children and adolescents with AS (Barnhill, 2001; Butzer & Konstantareas, 2003; Hedley & Young, 2006).

Social outcomes. AS is largely a social disorder, and it has been demonstrated widely that the prognosis for social outcomes in ASD is poor. Individuals with AS show great impairments in their ability to be involved in reciprocal communication and demonstrate an inability to understand unspoken social rules (Attwood, 1998). Unlike other individuals with ASDs, those with AS have a desire for social interactions with others. Their social impairments often come from deficits in being able to initiate and respond to different situations in addition to being unable to infer the thoughts or beliefs of others (viz theory of mind) (Barnhill, 2001; Ozonoff & Rogers, 2006). Their conversations are narrow and focused on the child's own interests, and they rarely show consideration for the interests of the listener. Individuals with AS are commonly described as being socially awkward, for example by asking inappropriate questions, being in too close proximity of others and being aloof. It is deficits like these, which restrict them from developing quality peer relationships (Szatmari, 1991). In a study (Brereton, Tonge, & Einfeld, 2006) comparing the psychopathology of children with Autism versus young people with intellectual disability, it was found that children with Autism were troublemaking, self-centered and anxious. In addition to this they also had difficulties with disturbed communication and social relating. Compared to children with intellectual disability they also had greater levels of hyperactivity and depression. The finding that symptoms of behavioural and emotional disorders co-occur is consistent in the literature (Lainhart & Folstein, 1994; Smalley, McCracken, & Tanguay, 1995;

Steinhausen & Winkler Metzke, 2004). Their disruptive behaviour results in a reduction of learning time and is a factor in their failure to function in integrated schools (Einfeld & Tonge, 1996).

In a study on adult outcome for children with Autism (Howlin, Goode, Hutton, & Rutter, 2004), the overall results showed that a small portion of adults with autism were independent. Most were reliant on their family or support services. There were also few that lived alone, had employment, or close friends.

Individuals with ASDs demonstrate a lack of social competence (Merrell, Gimpel, & Peacock, 1998).This affects the potential of children with ASDs to create and maintain friendships, identify and deal with bullying and explore their social environments. This can be frustrating for children with HFA or AS as they generally do want to make friends and be social but lack the ability to do this (Myles & Simpson, 2002). During puberty this becomes especially stressful for these children as they become aware of their own social awkwardness and that they are different from their peers (Schopler & Mesibov, 1992). There is some evidence of deterioration in social functioning during adolescence (Nordin & Gillberg, 1998), while others report an increase in social interest (Dawson, Galpert, Schopler, & Mesobov, 1986; Rutter & Schopler, 1987), however this does not mean an increase in social functioning. The deterioration in social functioning could be due to the gap in development between them and their typically developing peers becoming more obvious during this period. If these children do not receive assistance they frequently become socially withdrawn (Bauminger, Shulman, & Agam, 2003), further affecting their social competence and affecting their quality of life (Rogers, 2000). Friendships are particularly of importance during adolescence (Allen, Porter, McFarland, & Marsh, 2005; Collins & Laursen, 2004; Durkin, 1995; Hartup & Stevens, 1999; Bearnt, 1982). The

demonstrated relationships between friendship, loneliness and depression show that creating quality friendships has large impacts on the mental health of those with AS. In longitudinal studies (Howlin et al., 2000; Mawhood, Howlin, & Rutter, 2003) it has been demonstrated that those who receive no intervention show meaningful deficits in communication and fitting in with their peers at an age-appropriate level, so it is extremely important that they receive assistance.

Basic emotions (e.g., happy, sad, angry) are recognized by individuals with HFA/AS from facial expressions, however they find more sophisticated emotions, for example surprise or embarrassment harder (Capps, Yirmiya, & Sigman, 2006). One thing which makes it difficult for them to learn new facial expressions, emotions and perspectives of others (theory of mind) is their deficit in executive functioning which requires the ability to integrate and process information from a variety of sources. Social communication deficits of autism involve impairments in both verbal (spoken) and non verbal (unspoken) domains such as pointing, eye contact or smiling (Seltzer, Shattuck, Abbeduto, & Greenberg, 2005). There are further impairments in reciprocal social interactions which affects about half of the autistic population (Seltzer et al., 2005). These include sharing emotion, understanding how others think and feel (empathy) and holding a conversation. The parent-child attachment relationship is often affected as a result of reduced opportunities of sharing positive affect, which leads to an overall decrease in interaction. It is more difficult for parents to interact with their child and they do not progress to a goal-directed partnership (Bowlby, 1969). Furthermore, conversation in individuals with autism is often impaired. They abruptly shift topics, have difficulty selecting appropriate message content and have difficulty distinguishing between previously given and new information.

Another view of the social deficits in ASD focuses on an impaired understanding of the self. The earliest evidence for an understanding of self is the ability to recognize one's own image in the mirror, which emerges in the second year of life (Dawson et al., 1986; Spiker & Ricks, 1984). Children with ASD are unable to recognize themselves and lack any evidence of self-realization emotions like embarrassment, shame and guilt. This implies a lack of awareness and/or concern for other's evaluations (Travis & Sigman, 1998). Because children with ASD do not take other's perspectives in to account, this may lead to social relationship difficulties. A consequence of this may be awkward, inappropriate or impolite social behaviour reducing potential social relationships. Further evidence of poor interpersonal skills comes from pride and mastery studies. For example children with ASD may smile to themselves when completing a puzzling task but do not look up at an adult to share their emotions (Kasari, Sigman, Baumgartner, & Stipek, 1993). This may reduce learning opportunities and be perceived by other children as a failure to show social signals and lead to rejection or social neglect.

There are also abnormalities in their quality of produced emotional expressions. For instance, the vocal expressions of children with ASD are more ambiguous than those of typically developing children (Bullowa, 1979). Children with ASD are also less responsive to emotional signals of adults and may also have difficulties understanding emotions (Sigman, Kasari, Kwon, & Yirmiya, 1992). In addition children with ASD show some deficits in understanding belief-related emotions and in understanding self conscious emotions such as pride and shame (Travis & Sigman, 1998). However, children with ASD are competent in identifying and explaining their own and others' emotions (Capps, Yirmiya, & Sigman, 1992). The most severe emotional problems in ASD are difficulties in perceiving, producing and responding

to emotional signals. This is likely to impede social relationships with individuals with Autism appearing awkward, socially uninterested or even self-absorbed.

Children with ASs impairments mean they face difficulties everyday with emotional understanding, social communication subsequently, friendships. This often results in loneliness, depression and anxiety. The sections above on emotional, behavioural and social outcomes illustrate a picture of the struggle these children face in their day-to-day lives, painfully trying to navigate their social environments. It is critical that these children receive interventions aimed at improving their socio-emotional abilities to improve their wellbeing.

Conceptual Underpinnings for the Study

To understand the social development and the teaching of social skills in computer interventions, the underlying theory behind the social deficits of individuals with ASDs must be explained. As detailed previously, various single-factor theories (theory of mind deficits, weak central coherence, executive dysfunction and joint attention) have attempted to account for the social deficits in ASD. A theory which integrates these single-factor theories is Social-Information Processing Theory (Crick & Dodge, 1994). This theory explains that children bring in previous experiences, dispositions and biologically limited capabilities into social situations, which consequently affects their inferences and interpretation of events/cues. The behavioral response of children to the situation is a function of processing these cues. The model in Figure 1 illustrates the steps which include (1) encoding of external and internal cues, (2) interpretation and mental representation of those cues, (3) clarification or selection of a goal, (4) response access or construction, (5) response decision, and (6) behavioral enactment (Crick & Dodge, 1994).

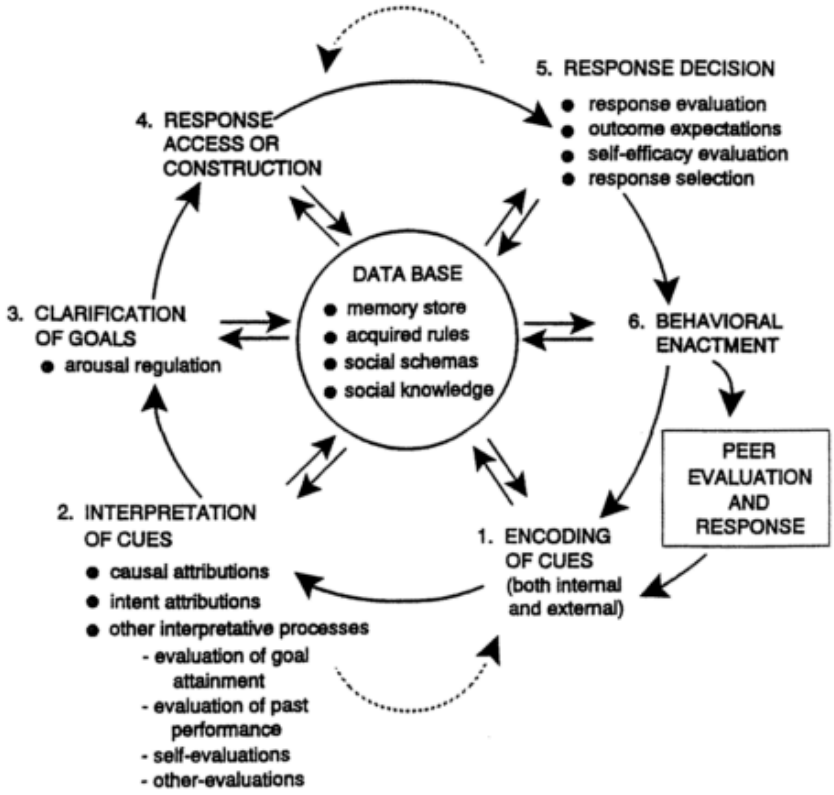

Figure 1. Social-information processing model of children's social adjustment (Crick & Dodge, 1994).

A previous study demonstrated that children with AS display alternative patterns of information processing at the intent attribution (due to theory of mind deficits), response generation, and response evaluation stages (Flood, Hare, & Wallis, 2011). Children with ASD are often referred to as being mind-blind, they have difficulty seeing situations from any perspective that is not their own. In comparison to control children, those with AS were less proficient in understanding and producing adaptive responses to social situations (Flood et al., 2011). The responses generated by the AS group were fewer, and characterized by non-social withdrawal (Flood et al., 2011). This finding is consistent with previous research (Bauminger et al., 2003; Meyer, Mundy, Van Hecke, & Durocher, 2006). Because children with ASDs engage in nonsocial withdrawal, they experience fewer opportunities for social interactions

with peers, which in turn means they experience less variety of social problem-solving responses. With this evidence in mind, importance is placed in intervening at the processing level of interpreting social cues and behaviours and on facilitating children with ASDs to generate and access a larger repertoire of behavioural responses as a replacement to withdrawal.

CHAPTER TWO: LITERATURE REVIEW

Due to the large evidence base of intervention research targeting social and emotional skills in ASD's a literature review published in 2008 is summarized. Then, a literature review on computer interventions is conducted, as this is the method used in this thesis to target social and emotional skills. The advantages of this method over other methods will be discussed.

Summary of literature published between 1977-2007

A literature review conducted by Ospina et al (2008) analyzed studies utilizing behavioural and developmental interventions for ASD, which were published between 1977 and 2007. There were 101 studies included which together included 2,566 participants where the median age was 5 years old. The participants had one of the following conditions: Autism, progressive developmental disorder, AS, HFA, atypical autism, not yet diagnosed autism and other conditions such as autistic savant or autistic-like conditions. The eight categories of interventions included for review were Applied Behaviour Analysis (ABA) interventions, communication-focused interventions, contemporary ABA, developmental approaches, environmental modification programs, integrative programs, sensory motor interventions, and social skills development interventions. No intervention was found to improve all autistic symptoms for all participants with ASD. However it has been shown that any intervention is better than no intervention at all. It is difficult to generalize the findings from the interventions used due to the heterogeneity of Autism. Although most if not all interventions were better than no treatment, it is recommended that treatment be tailored to the individual to suit their needs.

For ABA interventions, Lovaas therapy (Eldevik, Eikeseth, Jahr, & Smith, 2006; Lovaas, 1987 as cited in Ospina et al., 2008) was found to be more effective than special education, standard care and regular instruction in terms of improving adaptive behaviour, interaction, comprehensive language, daily living skills, expressive language, and overall intellectual functioning (Ospina et al., 2008). The studies evaluating Lovaas therapy were limited however, in that they had few participants and short-term follow-up (Ospina et al., 2008). The effects of discrete trial learning were found to be inconsistent, although when compared to no treatment, statistically significant findings were reported (Howlin, 1981; Pechous, 2001; Tung, 2005 as cited in Ospina et al., 2008).

As for contemporary ABA (Sofronoff, Attwood, & Hinton, 2005; Sofronoff et al., 2007; Tonge et al., 2006 as cited in Ospina et al., 2008) significant improvements were found following cognitive behavioural therapy for children's behaviour management, social skills, and parent's mental health. The evidence is limited and therefore no conclusions have been made for differing combinations of discrete trial training, incidental teaching, pivotal response training, and milieu teaching (Bloch, Gersten, & Kornblum, 1980; Jocelyn, Casiro, Beattie, Bow, & Kneiz, 1998; Connie Kasari, Freeman, & Paparella, 2006; Wang, 2005 as cited in Ospina et al., 2008). In spite of this though there is some evidence for pivotal response training improving communication and social interaction (Koegel, Bimbela, & Schreibman, 1996; Openden, 2005; Stahmer & Gist, 2001 as cited in Ospina et al., 2008).

In evaluating communication-focused interventions, there were significant improvements in emotion recognition, close generalization tasks, verbal IQ, attention and motivation (Ospina et al., 2008). These studies (Golan & Baron-Cohen, 2006; Moore & Calvert, 2000; Silver & Oakes, 2001 as cited in Ospina et al., 2008) were

methodologically strong as they were all RCT's and used varied control groups including no treatment in addition to alternative intervention comparisons. However when the authors conducted a meta-analysis the results were not statistically significant when comparing computer assisted instruction and no treatment on measures of facial expression recognition (Ospina et al., 2008). It was found that sign language improves articulation competence, oral language, non-verbal communication, and child-initiated speech (Oxman, Konstantareas, & Liebovitz-Bojm, 1979; Saraydarian, 1995; Yoder & Layton, 1988 as cited in Ospina et al., 2008). There was also one piece of evidence, which demonstrated that a Picture Exchange Communication System (PECS) compared to regular instruction produced a significant increase in communication initiations and dyadic interactions (Carr & Felce, 2007 as cited in Ospina et al., 2008).

Developmental interventions were found to be varied and to have limited evidence (Ospina et al., 2008). There were no short-term differences between Developmental Individual Difference Relationship-based (DIR) and a no treatment group in aggression, self-stimulating behaviour, and social skills (Gonzalez, 2006 as cited in Ospina et al., 2008). Two incidental teaching-based approaches in social interaction (Eagle, 2006 as cited in Ospina et al., 2008) and two milieu-based approaches in communication and play behaviour (Amy & Juliann, 2006, as cited in Ospina et al ., 2008) were compared against no treatment. There was no evidence of effect for these comparisons on measures of parent's attitude towards ASD, children's aggressive problems, external problems, and depressive or anxiety symptoms (Beckloff, 1997 as cited in Ospina et al., 2008). Comparisons between PECS and milieu therapy in communication and play behaviour were positive (Wendy, 2006 as cited in Ospina et al., 2008). A comparison between More than Words (a DVD parent

guide book) to a wait-list control demonstrated positive results for facilitative strategies and vocabulary size, however there were no significant differences in social skills, behaviour, parental stress or adaption (McConache, Randle, Hammal, & Le Couteur, 2005 as cited in Opina et al., 2008). Response training was found to be more effective than standard care in terms of the quality of reciprocal social communication and expressive language (Aldred, Green, & Adams, 2004 as cited in Ospina et al., 2008). The Scottish Center program showed positive results compared to a wait-list control on measures of joint attention, social interaction, imitation, daily living skills, motor skills and adaptive behaviour (Salt et al., 2002 as cited in Ospina et al., 2008).

Integrative programs include Lego therapy, social skills programs, and TEACCH. Lego therapy has been shown to successfully produce significant improvements in social skills and autistic symptoms. However, social skills programs have produced inconsistent findings (Ospina et al., 2008). TEACCH has produced significant results for improving fine motor and gross motor skills, cognitive performance, social adaptive functioning and communication (Ozonoff & Cathcart, 1998; Panerai, Ferrante, & Zingale, 2002; Tsang, Shek, Lam, Tang, & Cheung, 2007; Van Bourgondien, Reichle, & Schopler, 2003 as cited in Ospina et al., 2008). Overall though, evidence for integrative programs is limited or inconsistent, and the components responsible for producing changes in behaviour need to be evaluated specifically.

Sensory motor interventions including creative dance (Greer-Paglia, 2006 as cited in Ospina et al, 2008) and horse riding (Mason, 2005 as cited in Ospina et al., 2008) demonstrated significant social improvements. Social stories studies (Andrews, 2004; Bader, 2006; Feinberg, 2001; Quirmbach, 2006; Romano, 2002 as cited in Ospina et al., 2008) have shown statistically significant results for a variety of

outcomes related to social interaction at short-term. There is preliminary support to consider it a promising intervention.

In summary of this review, it is evident that there is no clear answer as to which the most effective therapy to improve symptoms associated with ASD is. There is some variation in study results due to the different lengths in follow-up across studies, components are implemented in different ways and consideration is needed to see if observed changes are maintained over time.

Computer-based interventions. Many of the intervention efforts for children with ASD are aimed at improving social skills in order to alleviate the social isolation typically associated with ASD. While the use of social stories, video self-modeling, self-management, priming written scripts and pivotal response training have been effective for teaching social skills (Scattone, 2007), the literature review conducted as part of this study will focus on computer-based interventions. This is because it is worth exploring advantages the use of technology in teaching social communication may have over other methods used. Computer interventions are often more cost effective, children are motivated to learn using a computer, they are more attentive, it enhances interaction within the intervention, intervention programs are easily individualized, the child can work at their own pace, and the interventions are predictable in design (Panyan, 1984). There is also the option for computer-based interventions to be used independently, with minimal parent or caregiver commitment necessary.

To investigate the effectiveness of computerized interventions for individuals with ASD, a literature search was conducted using Science Direct, PsycINFO and the University of Canterbury library database. Key search terms used were: *autism,*

Asperger syndrome; communication; social skills in conjunction with words related to computer technology: *computerized; interactive; internet; game; multimedia*; and *intervention*.

The criteria for articles to be included in this review were: (a) the intervention used was designed to improve at least one of the following: social skills, emotion recognition, communication; (b) the participants used had a recognized diagnosis of ASD; (c) the primary medium of treatment delivery was via interactive multimedia; and (d) the study was published after 1995. Based on these criteria, ten studies were included for review. These are summarized in Table 1 (see Appendix A).

Computer-Based Training to Target Skills in Children with Autism

Emotion recognition. A core deficit of autism is a difficulty in theory of mind, where they have trouble understanding and reasoning about other individuals mental and emotional states (Swettenham, 1996). Training individuals in emotion recognition can develop this ability. Five peer-reviewed articles that used computer interventions to teach emotion recognition were included in this review. Silver & Oakes (2001) evaluated the effect of the program *Emotion Trainer* on teaching children with ASD to recognize and predict emotions in others. This intervention used photos of real people in addition to animated emotional expressions in order for individuals with ASD to learn about emotions. The results showed children with ASD had improvements in their abilities to recognize and predict emotions in others. This was proportional to the number of times the child used the program. Golan & Baron-Cohen (2006) evaluated the efficacy of *Mind Reading: The Interactive Guide to Emotions.* This intervention involves a system of emotions and mental states. Emotions are presented by showing a short video clip on which the participants are then quizzed. The participants with high functioning autism and Asperger syndrome

gained significant improvements in being able to recognize emotions from faces and voices and the number of emotion concepts recognized when tested with stimuli used in the training program. Therefore, interventions did produce improvements in children's ability to recognize emotions, however, these improvements often did not generalize into the natural environment. It could be that this technique is not effective for teaching such a skill, and that it is a difficult one to develop and maintain. Therefore additional research on techniques used to teach and the method of delivery is required to gain a better insight of the methods potential to teach this skill.

Social skills. The second core deficit of ASD often targeted by computer interventions is social skills. Children with ASD demonstrate poor social understanding and awareness (Travis & Sigman, 1998). This makes it difficult for them to create and maintain friendships and be incorporated into mainstream classrooms (Bernard-Opitz, Sriram, & Nakhoda-Sapuan, 2001). Five peer-reviewed articles that used computer interventions to teach social skills were included in this review. Beaumont & Sofronoff (2008) combined a computer-based learning intervention with in vivo groups and parent involvement to teach social skills to children with Asperger syndrome. Children showed a greater increase in parent-reported social skills and knowledge of emotion-coping strategies compared to waitlist controls. In addition these results were maintained and follow-up. Whalen, Liden, Ingersoll, Dallaire, & Liden (2006) evaluated the use of a computer intervention called *TeachTown* which incorporates applied behaviour analysis principles. Children improved their social understanding and demonstrated decreases in inappropriate language. Parents, special education teachers and clinicians gave high ratings to the program and showed a strong interest in purchasing it. In spite of these early positive results, research in this area is at an early stage and is thus highly

exploratory and some results inconsistent. While these interventions demonstrate potential, as social skills require interaction with other people, relying on a computer intervention alone may not be sufficient. Computer interventions which incorporate interactions with real people as well may prove more effective by supporting generalization, and improvements maintained at follow-up (Beaumont & Sofronoff, 2008).

Existing limitations and methodological concerns in the literature on computer-based interventions. There are several reoccurring limitations in the current literature on computer interventions for ASD. A core issue is poor generalization and transfer of emotion recognition and social skills to the natural environment. As shown in Table 1, other studies have been limited by small sample sizes, homogenous samples terms of age, diagnosis and demographics. Also, there is often a lack of follow-up in most studies. While there are clear improvements in ability to recognize emotions (Bolte et al., 2002; Golan & Baron-Cohen, 2006; Hopkins, Gower, Perez, Smith, Amthor, Casey Wimsatt, & Biasini, 2011a; Lacava, Golan, Baron-Cohen, & Myles, 2007; Silver & Oakes, 2001), understanding emotional states (Silver & Oakes, 2001), imitation of emotional expressions (Bolte et al., 2002), social interactions and skills (Beaumont & Sofronoff, 2008), social problem solving (Bernard-Opitz et al., 2001), social understanding (Mitchell, Parsons, & Leonard, 2006; Whalen et al., 2006) stemming from computer-based intervention, the generalization of improvements to the natural environment is less clear.

The purpose of this literature review was to evaluate the current interventions to assess the strengths and limitations of research using computer interventions in ASD. Given that much of this research is in its infancy, this thesis aims to examine the clinical utility/efficacy of a new computer-based intervention *MyFriendQuest*

completed in a school setting with 1:1 support on the social behaviours of children with ASD and reading skills. . Due to the level of support provided by the research, the intervention will be termed *AssistedMyFriendQuest* when referring to the intervention as whole (i.e., the different components of it and the support of the researcher which is further discussed in the procedures section). The term *MyFriendQuest*, will be used when referring solely to the software program. As a package, *AssistedMyFriendQuest* seems to address many of the previous limitations identified in previous studies. It is by comparison to the interventions reviewed, a more interactive programme as the participant controls a character (a starfish) through a visually and musically stimulating environment to meet different characters from which they learn emotion recognition and social skills. This study uses an A-B-A repeated measures design using three participants, each from a different school, and different ages. The study involves naturalistic observations to see if any intervention effects generalise to the natural environment. It also uses a follow-up phase to see if any effects are maintained and interviewed the participants, their parents and their teachers to assess social acceptability and to include their viewpoints about the program.

CHAPTER THREE: METHOD

Participants

Ethical approval was sought through the University of Canterbury Education Human Ethics Committee. Children were identified by Resource Teachers of Learning and Behaviour (RTLB) following approved ethical procedures. A RTLB manager was informed of the inclusion criteria. The manager gave the approved information sheets about the study and consent forms to the RTLBs of several schools. These RTLB's selected appropriate participants for the study in consultation with teachers. A copy of the Approval letter, Information Sheet for Teachers, Teachers, Parents and Children, and Consent Form for Parents Children are provided in Appendices B-G. Behavioural assent was gained from each participant at the start of each session, and participants were able to freely leave any session at any time.

The inclusion criteria for the study were that the participant had a current diagnosis of Asperger's Syndrome or High-Functioning Autism, were able to communicate verbally with others and had basic reading skills. The exclusion criteria for the study were low to mid levels of functioning on the Autism spectrum, low reading skills or lack of verbal communication. These children were excluded because *MyFriendQuest* requires the participant to be able to read basic sentences in order to complete the intervention successfully. In addition, verbal communication between the participant and caregiver was necessary to complete additional activities in the intervention.

The children nominated for participation were judged by RTLBs to have potential to benefit from having some additional teaching in making friends and recognizing emotions. Each student was included in a general education classroom in

primary (elementary) schools in the Canterbury region of New Zealand. Paediatricians or general practitioners had provided the diagnoses for the participants prior to and independent of their participation in the study.

Hermione. Hermione, a 10-year-old girl with Asperger's Syndrome was said to be an intelligent student by her teacher and excelled at reading and writing in school. Aside from these strengths, it was reported by her mother and teacher that Hermione had difficulty reading emotions and body language. She had difficulty making friends at school, which her mother said was getting her "down". Her general medical practitioner had only diagnosed Hermione with AS two-months prior to the beginning of the study. She had been seeing a counsellor independently of the school, due to being bullied and not having any friends. The counsellor had suspected she might have AS so her mother took her to the medical practitioner to confirm the diagnosis. Hermione received no extra teacher aide or other support at school.

Ron. Ron was a 12-year-old boy with Asperger's Syndrome and ADHD. Ron was diagnosed when he was three years old by a pediatrician. He was described by his teacher as an "intelligent student with a good sense of humor, although often distracted and could be off-topic". When commenting on his academic ability, his teacher said he was very good at reading and spelling. He struggled with mathematics so received assistance with this. Ron was prescribed Rubifen (slow release) during the school hours. Rubifen is a brand name for the psychostimulant drug methylphenidate used in the treatment of ADHD. Both his mother and teacher stated that his friendships were one-sided, and that he was only interested talking to those who were interested in what he was interested in. In interview, Ron stated that he liked being alone because it meant that *no one could annoy him*. Rather than showing emotion

with his face, Ron tended to use his hands. For example if he was happy he would give a thumbs up sign, if sad, he would cover his eyes with his hands.

Ron spoke in complete sentences. According to his teacher, Ron did not participate in group discussions unless asked a question. The manner of speech and the type of language he used was that of an adult, and he spoke in a matter-of-fact tone. Ron was a very able reader. He was seen reading encyclopedias and chapter books; he was also able report what he had read in these books. He received teacher-aide assistance for one hour a day.

Harry. Harry was a 12-year-old boy with High-Functioning Autism. Although a member of a general education class, he received additional support from a full time teacher aide. His teacher aide and mother commented that Harry had made recent improvements academically; he had gone up a level in spelling and mathematics. His mother commented that mathematics *came easy to him*. Harry required support to read at the level expected by his age. A paediatrician diagnosed Harry when he was two-years-old, his mother having reported that it was obvious by age two that he did not play normally, instead he lined up his toys and put them in order. Harry was described by his mother as being friendly and sporty. His teacher reported that he frequently had tantrums at school and was often distracted. Harry was able to communicate what he wanted and needed and spoke in simple sentences. Harry was said, by his teacher aide, to have difficulty in group situations. For example in team sports he would not know where to go, and in discussions he would sit and play with his hands.

Setting

Parent interviews were undertaken at their respective houses, and teacher interviews were held in school classrooms, staffrooms or offices. Participant interviews and the intervention were undertaken at the participant's respective schools. Participants each went to a different school. At Harry and Hermione's schools, the interviews and intervention took place in small rooms attached to the classroom. Interviews and sessions with Ron were undertaken in a foyer between two classrooms. The observations were completed at interval (a 20 minute morning break) for Hermione and at lunchtime for Harry and Ron. All schools had a policy whereby students had to sit a specified area for 10 minutes and eat their food before they could leave to play. At Hermione's school this happened 10 minutes before interval and the class ate inside. Ron and Hermione usually spent their time at interval and lunchtime in the library and Harry spent his time either on his computer in the classroom or in the playground. For all participants, this was the case for baseline, intervention and follow-up.

Materials

A 13-inch mid-2009, MacBook Pro laptop was used to play *MyFriendQuest* (Ahmad, 2009). A two-button Logitech mouse with a yellow sticker on the left click button was provided as an alternative to the MacBook Pro's touch pad to make it easier for the participant to know which button to press. However participants preferred to use the touch pad, thus the Logitech mouse was not used after the first sessions.

The manualised computer-based intervention called *MyFriendQuest* (Ahmad, 2009) is downloadable via purchase from http://myfriendquest.com (in this study *MyFriendQuest* was purchased over the internet using a grant from the Psychology

Department at the University of Canterbury). As *MyFriendQuest* is a *Microsoft Windows* program only, *Parallels 7* was installed on the MacBook Pro, which allowed *Windows 7* to be run virtually.

MyFriendQuest (Ahmad, 2009) AS and HFA to recognize, perceive and respond appropriately to emotions (Ahmad, 2009). Children learnt about the perception and management of emotions and how to act in social situations. In order to do this, *AssistedMyFriendQuest* "introduces cognitive behaviour therapy" (Ahmad, 2009, p.11). The intervention had easy and difficult levels. Figures in the Appendix (see Figs 11 and 12, Appendix H) show how the intervention was played. A mirror was also required to play one of the additional activities, which will be explained below. *MyFriendQuest* is played by controlling a starfish character called Vinny using a mouse. As Vinny is moved to the right different characters in the intervention show up as a white silhouette. When a character's silhouette was clicked a dialogue opened up where the child was asked to make a face, for example a happy face. The players choose the eyebrows, eyes and mouth, which made a happy face. If correct, the character's silhouette was changed into a completed picture of the character. The manual states that first the 'easy level' of *AssistedMyFriendQuest* should be used with another individual's (e.g., caregiver) assistance, and then the child should be able to use the 'easy level' independently. Once the 'easy level' is complete, the child progresses to the 'difficult level' with another individual's assistance. Then the child can progress to using the difficult level independently.

Angry Birds^{TM} was used as a reward for co-operating with the researcher. It is a popular game, which has short levels where birds with unique abilities are flown at green pigs. The player is given a restricted number of birds to use in each level. When all of the pigs have been killed by the birds the player has completed the level.

Measures

Parent and teacher ratings of child's behaviours. Parents and teachers completed a number of items, rating participant behaviours, prior to baseline, and again following the completion of the intervention. Interview booklets (for pre and post interviews see Appendices I-L respectively) were compiled from items in selected subscales of the Child Behaviour Checklist 6-18 (CBCL: Achenbach & Rescorla, 2001), the Strengths and Difficulties Questionnaire (SDQ: Goodman, 2005), and the Social Responsiveness Scale (SRS: Constantino & Gruber, 2005), which related to variables targeted in the intervention, were chosen. As there were multiple questionnaires one response scale was used for all of them in the form of a 3-point scale from 1 (*not true*) to 3 (*certainly true*).

The CBCL is a parent-rating scale to investigate emotional and behavioural problems in children aged 6-18. Three questions about friendship were selected from the CBCL. An example question was "*About how many close friends does your child have?*". In this study the CBCL was used to inform discussion about the participants' behaviour. The CBCL has been used in a previous study teaching social skills to children with autism (Leaf et al., 2009).

The SDQ is a 25 item brief emotional and behavioural screening questionnaire, which asks about children's negative and positive psychological attributes e.g., "*Picked on or bullied by other people*". The 25 items in the SDQ make up five subscales (emotional symptoms, conduct problems, hyperactivity scale, peer problems scale and prosocial scale) of five items each. The SDQ has been used in other studies for ASD (Chalfant, Rapee, & Carroll, 2007). In the present study, the emotional symptoms, conduct problems and hyperactivity subscales were excluded, firstly, because they were not intervention targets, and secondly, to keep the time of the

interview down. In addition to these subscales the extended version used in the study has an additional component (called the impact supplement scale), which enquires about the impact any problem the child has on chronicity, distress, social impairment and burden for others (8 items).

The SDQ uses a 3-point scale, Somewhat True is always scored as 1, but the scoring of Not True and Certainly True varies with the item (reverse scoring). The scores for each of the scales range from 0 to 10 and are classified as normal, borderline and abnormal. An abnormal score on a scale can be used to identify those with mental health disorders. The impact supplement of the SDQ for the items on overall distress and social impairment can be summed to generate an impact score ranging from 0 to 10 for the parent-completed version and from 0 to 6 for the teacher-completed version, therefore possible total impact score between the two informants differs. They are scored on a 4-point scale from Not At All being scored as 0, Only A Little scored as 0, Quite A Lot scored as 1 and A Great Deal is scored as 2. The responses on chronicity and burden to others are not included in this impact score if the respondent answers "no" to the first question of the impact supplement. A total impact score of 2 or more is abnormal, 1 is borderline, and 0 is normal. Improvements are demonstrated by a decrease in PeerProblems and Impact scores, and an increase the Prosocial score.

The items are worded positively (e.g., *"Prosocial Scale"*) to increase public acceptability of the scale. Information about the SDQ and copies of the questionnaire are freely available in over 40 languages from http://www.sdqinfo.com. In the present study items from the Parent 2005 version for 4-16 year olds was used an the normative data for Australian populations was applied (see Table 2 and 3) (Mellor, 2005). Normative data for girls aged 7-10 was used as Hermione was 10 years old

(Table 3). Table 4 displays the clinical cut-off scores for parent and teacher ratings. These cut-off scores identify individuals who are likely to have a mental health disorder.

Table 2

SDQ Means (Standard Deviations for 11-13 Year Old Boys (Australian Normative Data, Mellor, 2005)

	Parent SDQ M(SD)	Teacher SDQ M(SD)
Peer problems	1.6 (1.9)	1.5 (1.6)
Prosocial behaviour	8.2 (1.7)	7.3 (2.3)

Table 3

SDQ Means (Standard Deviations for 7-10 Year Old Girls (Australian Normative Data, Mellor, 2005)

	Parent SDQ M(SD)	Teacher SDQ M(SD)
Peer problems	1.5 (1.9)	1.5 (2.0)
Prosocial behaviour	8.7 (1.6)	8.4 (1.8)

Table 4

SDQ Clinical Cut-Off Scores for Borderline and (Abnormal) Ratings

	Parent	Teacher
Peer problems	3 (4)	4 (5)
Prosocial behaviour	5 (4)	5 (4)
Impact	1	2

In an investigation of the psychometric properties of the SDQ by Goodman (2005) the reliability of the SDQ was acceptable for the parent version (Cronbach $\alpha = .71$) and (Cronbach $\alpha = .81$) for the teacher version. Demonstrating discriminant validity the difference between clinic and community samples' SDQ scores was highlighted as significant for both sexes ($p < .001$).

Social impairment of participants was rated using the SRS which has been used in a previous computer intervention for HFA (Thomeer et al., 2011). Scales included were social awareness (8/8 items), social cognition (6/13 items), social communication (18/21 items), social motivation (8/11 items), and excluded were autistic mannerisms items (0/12 items). These were excluded, firstly, because they were not intervention targets, and secondly, to keep the time of the interview down. The numbers in brackets represent the total number of questions used in each subscale. A total of 40 items were used from the SRS. Improvement is shown by a decrease in scores. Examples of items from each subscale used are: social awareness (e.g., "Knows when he/she is too close to someone or invading someone's space"), social cognition (e.g., "Concentrates too much on parts of things rather than 'seeing the whole picture' (for example, if asked to described what happened in a story, child may talk only about the kind of clothes the characters were wearing), social

communication (e.g., "When under stress child seems to go on 'auto-pilot' (for example, shows rigid or inflexible patterns of behavior"), and social motivation (e.g., "Does not join group activities unless told to do so"). The SRS was normed on a sample of 1636 individuals from various areas in the United States (Constantino & Gruber, 2005), and the norms for the sub-scales used in the present study are shown in Table 5.

Table 5

SRS Treatment Subscale and Total Raw Score Means and Standard Deviation Means by Gender and Rater Type (Constantino & Gruber, 2005, p. 29)

	Teacher ratings[a]		Parent ratings[b]		Total[c]	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Males						
Social Awareness	7.0	4.1	6.3	3.1		
Social Cognition	8.1	6.4	6.1	4.5		
Social Communication	16.7	12.9	11.3	7.9		
Social Motivation	8.3	6.3	5.4	4.2		
Total	46.8	33.7	33.7	20.9	38.3	26.8
Females						
Social Awareness	5.4	3.5	5.5	2.8		
Social Cognition	6.2	5.5	5.1	4.1		
Social Communication	10.8	10.4	8.9	6.8		
Social Motivation	6.4	5.8	4.9	4.1		
Total	32.4	27.3	27.6	18.1	29.2	21.6
Average Total for Males and Females	39.6	31.4	30.5	19.7	33.6	24.7

[a]*N* = 555. [b]*N* = 1,081. [c]*N* = 1,636

In an investigation of the psychometric properties of the SRS the reliability was found to be good for parent ratings for males (Cronbach α= .94) and females

(Cronbach α= .93) and for teacher ratings for males (Cronbach α= .97) and females (Cronbach α= .96). The test-retest reliability was found to be acceptable (males *r* = .85, females *r* = .77). Inter-rater reliability data were good (mother-father *r* = .91, mother-teacher *r* = .82, father-teacher *r* = .75).

Child ratings of friendship, loneliness and anxiety. Participants completed a number of items, rating their friendships, loneliness and anxiety, prior to baseline and again following the completion of the intervention. The participant pre- and post interviews (copies provided in Appendix M-N) included questions from the Friendship Satisfaction Questionnaire (FSQ: Parker & Asher, 1993), the Friendship Quality Questionnaire (FQQ: Parker & Asher, 1993), the Loneliness and Satisfaction Questionnaire (LSDQ: Parker & Asher, 1993), and the Revised Children's Manifest Anxiety Scale – Second Edition (RCMAS-2: Reynolds & Richmond, 1985). As there were multiple questionnaires two different response scales were used. Some items used a 7-point Likert scale ranging from *0 – not at all* to *7- a lot* and others used a scale with seven emoticon faces (see Figure 2) ranging from happy to sad.

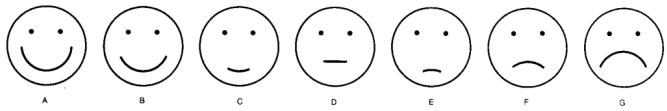

Figure 2. Faces scale used in participant questionnaires, ranging from happy to sad

To measure friendship satisfaction a measure adapted from (Parker & Asher, 1993) was used. Two questions were asked about their relationship with their best friend, "How is this friendship going?" and "How happy are you with this friendship?". The participant answered this question by indicating on a scale with seven faces, with a sad face at one end and a happy face at the other end (see the questionnaire in Appendix N). The participant scored this by circling the face, which

matches their satisfaction level, whereby the closer the circled tick is to the happy face, the more satisfied the child.

Participants also completed items rating the quality of their friendships prior to baseline and again following completion of the intervention. The FQQ explores perceptions of qualitative aspects of the child's relationship with their best friend. The psychometric properties of this measure are well established; it demonstrates good reliability and validity (Parker & Asher, 1993). Each sub scale was moderately to highly intercorrelated (r = .16 to .75), in addition the Conflict and Betrayal sub scale correlated negatively with other sub scales where other sub scales were positively intercorrelated (Parker & Asher, 1993). The FQQ is a good predictor of friendship satisfaction. Correlations from positive friendship quality subscales (i.e., validation and caring, companionship and recreation, help and guidance, and intimate exchange) were associated with higher friendship satisfaction scores, while on the other hand, conflict and betrayal scores were associated with lower friendship satisfaction. The correlations ranged from r = .35 to .52 and were all statistically significant ($p < .01$) (Parker & Asher, 1993). The FQQ has been used in a previous study to identify friendship, loneliness and depression in adolescents with AS (Whitehouse et al., 2009).

The LSDQ (Parker & Asher, 1993) was administered to assess children's loneliness and social dissatisfaction. This scale focuses on participants' feelings of loneliness (e.g., "I have nobody to talk to in class"). It also has filler questions to put children more at ease answering the researcher's questions (e.g., "I like to read"). It has been used in multiple studies with elementary school children and has good internal consistency (Chronbach $\alpha \geq .90$; (Asher, Parkhurst, Hymel, & Williams, 1990).

The RCMAS-2 was used to measure any changes in participant's level and nature of anxiety (see Table 6 for descriptive statistics). Subscales included in this study were social anxiety (11/12 items) and worry (10/16 items). The number in brackets shows how many items from these subscales were used out of the total number available. The items used are shown in Appendix O. The standardization sample for the RCMAS-2 consisted of 3,086 individuals aged 6 to 19 from the United States. The average raw scores for the RCMAS-2 full reference sample are shown in Table 5. The internal-consistency of the RCMAS-2 is good The Cronbach's alpha estimate for the total anxiety score is .92 (subscale estimates: physiological anxiety = .75, worry = .86, social anxiety = .80, and defensiveness = .79) (Reynolds, Livingston, Willson, & Willson, 2010). The RCMAS-2 has demonstrated good test-retest reliability (Reynolds et al., 2006), convergent validity with the State-Trait Anxiety Inventory trait scale ($r = .85$, $p < .001$) (Spielberger & Edwards, 1973), and divergent validity with the state anxiety scale ($r = .35$, $p < .05$) demonstrated by the statistically non-significant correlation. The RCMAS-2 has been used in a previous study with individuals with ASDs to identify anxiety, social deficits and loneliness (White & Roberson-Nay, 2009).

Table 6

Average Raw Scores and Standard Deviations for the RCMAS-2 Full Reference Sample (Richmond & Reynolds, 2008, p. 26)

Scale	*M*	*SD*
Total Anxiety	15.7	8.0
Physiological Anxiety	5.0	2.7
Worry	6.4	3.9
Social Anxiety	4.3	2.9
Defensiveness	3.6	2.3

Measures of instructional progress. During the intervention sessions, the number of character's emotion examples completed and thus correct per intervention session in *AssistedMyFriendQuest* (Ahmad, 2009) was recorded for each participant as a measure of instructional progress. This information was also used to determine when each participant had completed the 'easy' level and could move to the 'difficult' level of the instructional programme.

Direct observation of social skills. Using an interval recording procedure (Pierce & Schreibman, 1995), the participants were observed during the participants' school lunch break on five different days during baseline, five times during intervention and five times during follow-up for a total length of 20 minutes each time. Each observation minute was separated into six, 10-second intervals and target behaviours occurring during the interval recorded. The target behaviours recorded were: expressing emotion, maintaining interaction, initiating conversation, watching others and initiating play. Detailed examples of these observation measures are presented in Table 7. There were five target behaviours in total.

Table 7

Descriptions, Examples and Non-examples of Target Behaviour Dependent Measures

Measure	Description	Example	Nonexample
Expressing emotion	The participant displays facial demonstrations of emotion.	The participant is happy and smiles. The participant is sad and pulls a frown.	Participant displays a blank/neutral face this would not be scored as expressing emotion.
Maintaining interaction	The participant continues to engage in the same verbal or nonverbal activity with another peer.	The participant continues a game of handball by hitting the ball into the opponents square. The participant replies to a peer in a	An interval in which the participant is reading a book on their own, and not interacting verbally or nonverbally with

		conversation.	another individual.
Initiates conversation	Verbalisations that are not in direct response to a preceding question or that occurred at least 5 s after a preceding verbalization.	Saying “the ball is blue” or “I like pizza” , or “hello”	A verbalisation, which occurs less than 5s before a preceding verbalization e.g., a response to a question “Yes, I do play quidditch”
Watching Others	The participant passively watches their peers at play and does not maintain interactions with them in conversation.	The participant watches their peers play handball.	The participant actively engages in playing handball.
Initiates play	The participant initiates play verbally or nonverbally. They may approach or gesture to a peer to initiate play.	Participant hands a peer a ball or says “play ball?” conversation.	The participant is engaged in a game of handball already.

Definitions of behaviour adapted from (Pierce & Schriebman, 1995, p.158).

Social-emotional diary. The diary component (see Figure 3) of *MyFriendQuest* was used to measure the productivity of word use, and the use of emotional words in proportion to the total number of words produced in a whole diary entry.

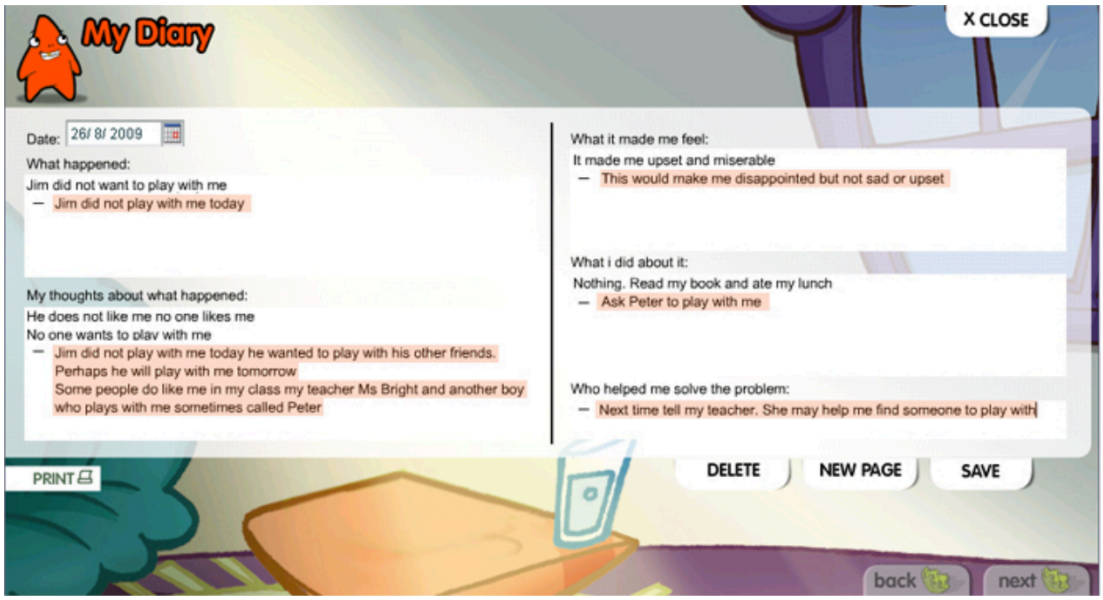

Figure 3. Diary used in MyFriendQuest (Ahmad, 2009)

Procedures

An A-B-A with replication across participants design (where A = baseline, B = the training phase, and the second A = a follow-up phase) was used to assess changes in emotion recognition and social skills of the three participants. Prior to the baseline phase of the experiment, interview data from parents and teachers was recorded. During the baseline phase, interview, diary and observation data were collected from participants and session summaries given to parents and teachers. During the intervention period, information on the number of emotions completed was recorded, as well as diary, observation data. In addition session summaries were given to parents and teachers. In the follow-up phase interview, diary, observation data and session summaries for parents and teachers were completed. At the end of the follow-up phase post-intervention interviews were completed with parents and teachers of the participants.

Pre-Study Interviews. During this phase parents and teachers were interviewed using the questionnaire booklets in Appendix K-L.

Pre-parent interviews. The interviews with parents took place mid-morning to late afternoon at their respective houses. On arrival the researcher introduced themselves as a Masters student at the University of Canterbury. They then gave the parent a brief overview of what would happen during the study (viz when and how often the researcher would see their child at school). A summary script of what the researcher would say is *"I am completing my Master of Arts in psychology at the University of Canterbury. As a part of that I am evaluating a programme, which teaches children with Autism or Asperger's Syndrome about emotions and friendship skills. I am doing this with several different children."* The parents were also reminded of the confidentiality of the study. The interview was described to the parent by telling them that it was made up from standard questionnaires used in psychological and educational practice. The answer card was also explained to them and that they could refuse to answer any questions. The researcher built rapport with the parent by arranging the questionnaire is such a way that more positive and general questions were asked first and discussed before moving onto more personal questions about their child. The researcher wrote out the parent's responses by hand. The interviews lasted approximately 60 minutes. At the end of the interview the parent was asked if they had any questions and that they would be e-mailed a calendar schedule of when the researcher would be seeing their child. The researcher thanked the parent for their time and participation.

Pre-teacher interviews. These interviews took place after 3pm when the school day had ended. The researcher would arrive at the school and sign the visitor's book. Similar introductions as given to the parents about the researcher and their study were given to the teachers. The confidentiality of the arrangement and information discussed was also discussed. The interview was arranged in a similar way to the parent interview to build rapport, in that the questions moved being general to more

specific questions about the participant. These interviews also lasted approximately 60 minutes. The researcher wrote the teachers responses out by hand. At the end of the interview the teacher was asked if they had any questions. The researcher thanked the teacher for their time and participation.

Baseline. The baseline phase consisted of five sessions. In each session a child interview would be conducted and an observation. After signing the school visitor's book the researcher would go to the participant's classroom and greet the teacher. The teacher would then tell the participant to go with the researcher. The researcher worked individually with the participant for approximately 30 minutes. During the first interview the researcher introduced themselves to the participant and described what would happen during the sessions with them. A script of what would be said was *"My name is Elyse, and I'm a student just like you but at the university. I need you to help me out with a project I'm working on. For the first five sessions I'm going to ask you some questions about yourself, then you can play Angry Birds™ on my computer for five minutes. After those five sessions we will start using the computer program to teach you about emotions and friends".* The researcher also explained that they would be observing them during interval or lunchtime. This was summarised to them by explaining, "*When I come to see you sometimes I will be watching what you and other children at your school are doing at interval and lunch because I am interested in what children do during this time. Do you have any questions?".* The participant was also told that what they told the researcher was private. The researcher built rapport with the participant by starting the questionnaires (see Appendix M) with general questions e.g., *"What tv shows/ movies do you like?".* The researcher also tried to find things that they and the participant had in common. For example Hermione and the researcher liked to play some of the same video games (e.g., *Lego Harry Potter™*). Each questionnaire was split up in five parts, at the end of each part the participant

was told *"Awesome the [insert section number here] is over, have a sticker"* and a sticker was placed in circle on sheet of paper with five circles on it so that the participant knew how much longer they had to go. Minimal encourages were given after/during participant answers e.g., *"mhmm"*, *"can you tell me more about that"*, *"I see"* to encourage the participant to keep talking. If the participants disclosed sensitive information about themselves, the researcher would give an anecdote of their own from when they were their age e.g., *"I found it really hard making friends too once when I moved schools".* This aided in building rapport and would sometimes lead to the participant disclosing further information. The interview included five questions at the end, which were identical to those in the diary used in *AssistedMyFriendQuest*. When the interview was over the participant was thanked and told that they could play Angry Birds™. At the end of the five-minute period the researcher told the participant *"At the end of this level we will finish"*.

Whilst the participant played Angry Birds™, the researcher wrote a summary of what had been covered in the session e.g., *"Today was the first interview session. We talked about things Hermione likes, her friendships, how she feels at school, what she worries about, her relationship with a selected friend or person she is closest to, and what she had been doing at school today".* A copy of the session summary was given to the participant to give to the parent; another copy was given to the participant's teacher by the researcher. The handwriting was in print so the participant could read it if they wished. After a few weeks of the study the parents were contacted to ensure that they were getting these session summaries.

During the observation sessions, the researcher would stand or sit in the general area where the participant was. The researcher was within view of the participant at all times. In the few times that a child that who was not the participant came up to the researcher to ask what they were doing, the researcher said *"I'm learning about what*

fun things kids do at interval and lunchtime". When they asked what the researcher was doing with their clipboard, the researcher said it was their *"secret code".*

Intervention. Following baseline, participants continued to meet individually with the researcher for the intervention phase, which consisted of 15-18 sessions. During the intervention, participants worked for 20 minutes each time through the *AssistedMyFriendQuest* application, with sessions two to four times a week for six to eight consecutive weeks, and participant observations continued. At the end of each session the participant completed a diary entry. In the first intervention session, the researcher explained to the participant that, *"I will see you three to four times a week and we will use the computer program, which try to teach you about emotions and friends and you will complete a diary entry."* The intervention instructions were discussed with the participant. The intervention was interacted with as set out in the manual, progressing from the easy level to the difficult level. The components of *AssistedMyFriendQuest* will now be described.

Easy level. First the easy level was played through with the researcher. The researcher provided feedback while the participant used the software. For example if the participant successfully completed an emotion the researcher would say "Well done". If the participant was having difficulty with an emotion, the researcher would provide assistance by making the expression on their own face, or suggesting they changed a specific feature of the face "How about trying a different mouth". The researcher also provided any prompting necessary to continue using the software e.g. "Now move onto the next character". The *MyFriendQuest* manual describes additional activities, which were completed with the researcher (i.e., mirror game, mute button guessing game, expression guessing game and a variations game). No more than two emotions were attempted per game as advised in the *MyFriendQuest*

(Ahmad, 2009) user guide. The activities were rotated so that one was completed per session. The additional activities are described below.

Difficult level. The difficult level was progressed to when the participant was able to use *MyFriendQuest* independently. Feedback was still provided by the researcher and assistance if the participant requested it. The difficult level of the intervention is intended to teach the participant the principles of cognitive behavioural therapy. The purpose of this was to allow the participants to analyse their feelings and reactions in addition to learning how to manage their emotions and deal with social situations more effectively. The difference between the easy and difficult levels was that the difficult level included questions about how to respond in certain social situations, identify inner/body feelings, or observe extra mannerisms that accompany the emotions. The questions were in a multiple-choice format. An example of a question was:

"Jessica is worried and has broken your toy by accident. How do you know it is an accident?'

A. Because Jessica is worried
B. Because Jessica is happy
C. Because Jessica is angry " (Ahmad, 2009, p.9)

As the participant encountered characters and they completed an emotion, for example the "angry" emotion, the participant was asked "can you think of a time when you were angry, tell me what happened?" The participant explained what happened, and if needed the researcher clarified the participant's understanding of word meanings and observations, so they could learn to understand how they interpret an event.

Activities. The activities were rotated through the sessions in the order: mirror game, mute button guessing game, expression guessing game and then the variations game. The activity would be completed at a random time when the participant was playing *MyFriendQuest.*

Mirror game. The mirror game is suggested in the *MyFriendQuest* manual, but is not a part of the software. In this game, the researcher provides a mirror, guides the 'game', and gives feed back. In the present study, the researcher placed a mirror in front of the participant. The participant imitated, or attempted to imitate, the expression the character is the game was demonstrating. The researcher observed the participant's face, and provided feedback or praise if the expression matched the characters e.g., "awesome", "that's great". If the expression did not match the character's, then the researcher said "See if you can do it like this" and produced the expression themselves. The emotions chosen for this were ones which the participant took more time to complete while using *MyFriendQuest.*

Mute button guessing game. The mute button guessing game is suggested in the *MyFriendQuest* manual, but is not a part of the software. In this game, the researcher muted the sound in the game, so that they could not hear what face the software was instructing the participant to make. In this game, the researcher sat out of view of the screen while the participant imitated each emotion as they encountered it. The researcher attempted to guess which emotion the participant was displaying. The researcher had five attempts at guessing the emotion, and if all attempts were exhausted and the researcher did not correctly guess the emotion then the researcher gave in and said "I give up, which emotion was it?". The researcher then suggested to the participant how they could make it clearer which emotion they were displaying. If the researcher was able to guess the emotion before the five attempts were exhausted then descriptive praise was given e.g., "great job, you made the emotion clear".

Expression guessing game. The expression guessing game is suggested in the *MyFriendQuest* manual, but is not a part of the software. In this game, the researcher displayed an emotion conveyed in the game and the participant would attempt to guess which expression was being displayed. The researcher displayed an expression and asked, "What emotion am I showing?" If the participant correctly identified the expression, then the participant was given verbal praise. If the participant did not describe the expression or described it incorrectly, then they were told to try again. If after five attempts the participants had not correctly described the expression then the researcher told the participant which emotion they were displaying. It was also explained.

Variations game. The variations game is suggested in the *MyFriendQuest* manual, but is not part of the software. In this game, the researcher explains that there are variations that come with expressing different emotions, for example a happy expression can be displayed with an open or closed smile. The researcher then demonstrated this. The participant also viewed demonstrations of voice tones and variations that come with being happy. The researcher demonstrated different voice tones and the participant was asked to guess which ones sound like a happy voice. For example it was explained to the participant that shouting does not necessarily mean an angry voice, but that the person may be really happy and excited.

Body chart. A body chart (see Appendix P) was included in the handbook for *MyFriendQuest* (Ahmad, 2009). The participant was shown the body chart and was asked how their body might feel for example when they are angry. Specifically they are asked how their head, heart, or chest feels etc. The aim was for the participant to identify as many features as they could, and these were recorded on the chart. A metronome may be introduced here or at any other point in the program. It was presented as a cartoon and it could also be muted. The metronome represented the

intensity of emotion by sounding the 'rhythm' in beats per minute. The participant could be helped to identify other words to explain each emotion. Colour was also used to describe emotions, where the participant could choose colours of felt pens to mark emotions on the body chart, and draw body parts in the colour they chose. The participant could also write what thoughts they might have whilst experiencing the chosen emotion around the chart with the same colour, for example if the thought was an angry one the body part may be coloured in red. Another body chart was then created, for example, "happy", and they were asked to describe a time when they felt "happy", and what experiences made them feel "happy". Next the participant also created a list of activities they could do to attempt to achieve this feeling.

Computer diary. The diary is a part of the *MyFriendQuest* software. The diary was used at the end of the 20-minute session of using *AssistedMyFriendQuest* (see Figure 13 in Appendix Q). The diary program provided a text box for the participant to write about what had happened in their day, their feelings about it, and what they did about it. Then the experimenter worked with the participant to examine ways to solve the problem in the future. The diary program stated questions asking, "What happened?", "My thoughts about what happened", "What it made me feel", "What I did about it?", "Who helped me solve the problem?". If the thoughts and feelings and actions recorded in the diary were not compatible with the event then the participant was helped to think of alternative ways of describing their feelings about the event in their diary. The participant's thinking and reasoning was challenged by discussing what they wrote (Ahmad, 2009, p.12).

Follow-up. The follow-up phase proceeded similarly to the baseline phase and extended over five sessions. The interview booklets in Appendix N were used. Follow-up began one week following the end of the intervention period.

Post-study interviews. The post-study interviews (see Appendix M-N) with parents and teachers were conducted in a similar fashion to the pre-study interviews. They were completed over a two-week period following completion of the follow-up period with the participant.

CHAPTER FOUR: RESULTS

As detailed in the method section, there are multiple sources of data for this study. There was data recorded whilst the participant played *AssistedMyFriendQuest*, yielding the number of emotion examples recognized and number of incorrect answers per session in addition to information collected through diary entries. Other sources of data are naturalistic observations and pre and post interviews with parents, teachers and participants. The repeated observation measures, namely number of words written in the diary each day, and the percentage of emotion words were graphed for visual analysis. Quantitative data from the parent and teacher interviews, diaries, and the participant interviews are presented in tables and organized by participant. The qualitative data detailing progressions and themes from the interviews and diaries are described thematically.

Training Program Data

The data recorded during *AssistedMyFriendQuest* was the number of emotion examples completed during each session. When the difficult level began, the number of incorrect responses to multiple choice questions regarding what to do in different social situations was also recorded.

Figure 4 displays the cumulative number of emotions completed across consecutive sessions in addition to the number of incorrect responses to the multiple-choice questions. As this is a cumulative graph, the closer the slope is to vertical the faster the participant's rate of learning is.

All participants improved in their ability to complete emotion examples at the same rate except for Harry who improved at a slightly lower rate. This could be because on the eighth session Harry reported that he was finding *AssistedMyFriendQuest* difficult. On the ninth session he was in a low mood and his

teacher aid had reported that he had not been having a good day and was uncooperative. Therefore, the decrease in performance could be attributed to external factors as performance increased after these sessions until the final session where Harry again reported that he was finding it difficult, at one point he put his head down and refused to carry on.

The results for the number of incorrect answers to the multiple-choice questions appear to vary between participants. Hermione's incorrect answers were consistently low and there were some sessions where she made no incorrect answers. Ron had the lowest number of incorrect answers and after his ninth training session he made no more incorrect responses. Harry appeared to choose incorrect responses at the same rate as he successfully completed emotions. Harry often rushed through the questions and required prompting to slow down and be read the questions and answers by the experimenter.

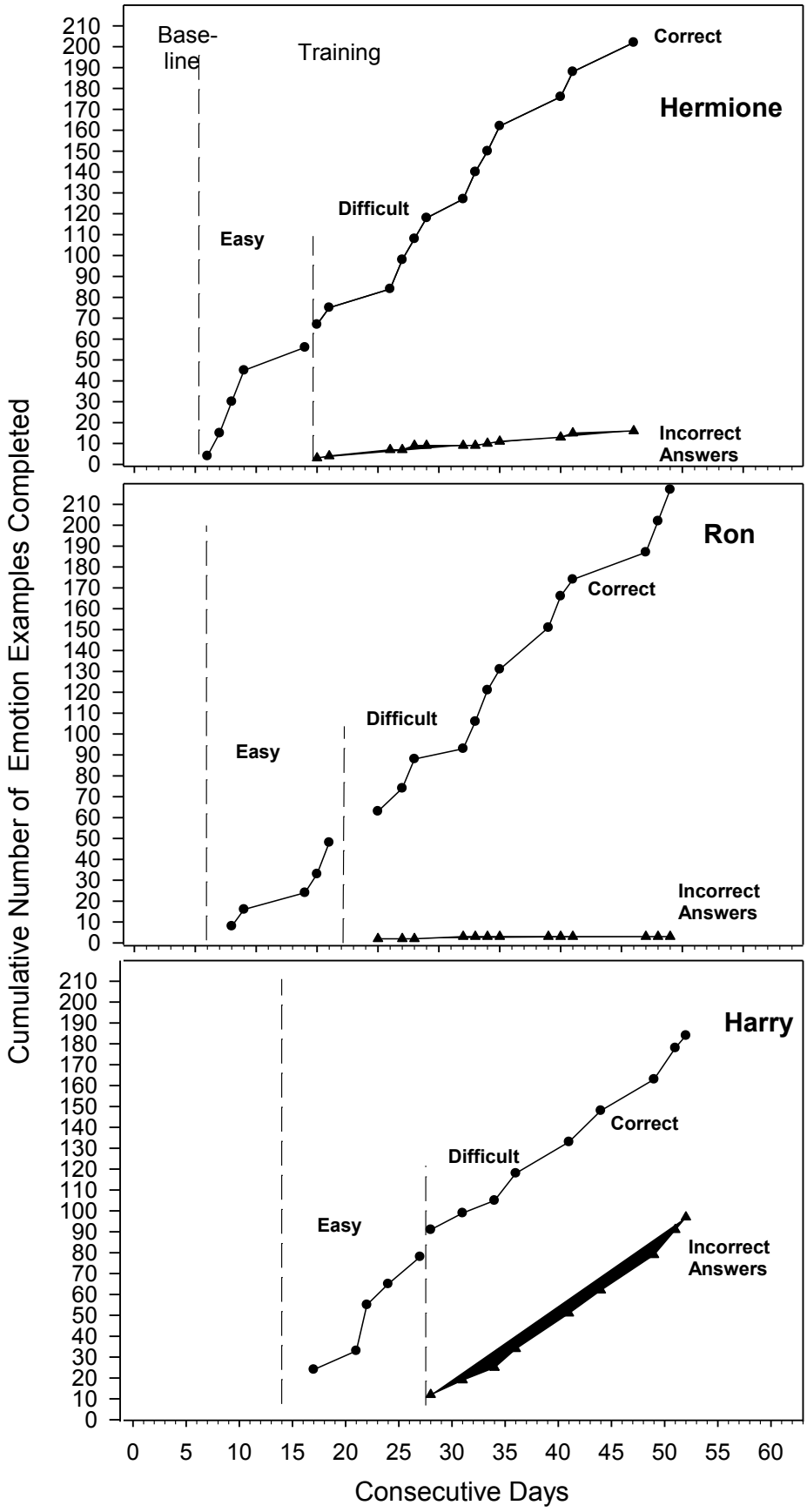

Figure 4. Cumulative number of emotion examples completed (-□-) and number of incorrect answers (-▲-) in *AssistedMyFriendQuest* for three participants.

Diaries. Data retrieved from the diary entries was the number of words in the diary, and the proportion of emotional words to the total number of words (e.g., *happy, sad, angry* plus internet slang which expresses emotion: e.g., *lol, rofl* etc.). Figure 5 displays the number of words in the diary each day and Figure 6 displays the percentage of emotion words used in the diaries during each phase of the study. All participants had an increase in the amount of words produced each session. Ron increased the number of words written in his diary at a higher rate than Harry and at a slightly higher rate than Hermione. There was an intervention effect for Hermione, as when she began using *AssistedMyFriendQuest*, the amount of words in her diary increased and this was maintained at follow-up.

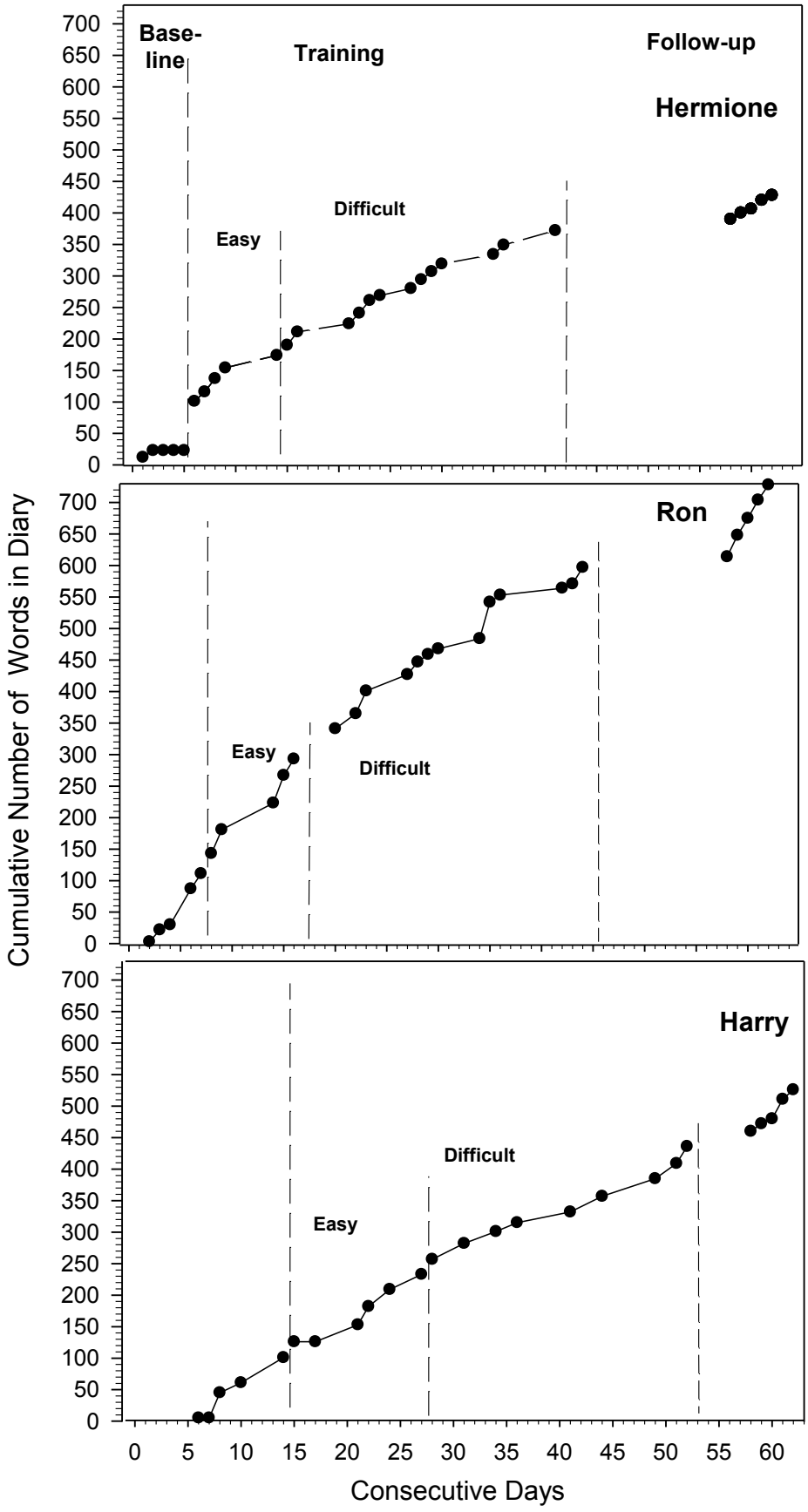

Figure 5. Cumulative number of words written in diary across consecutive days.

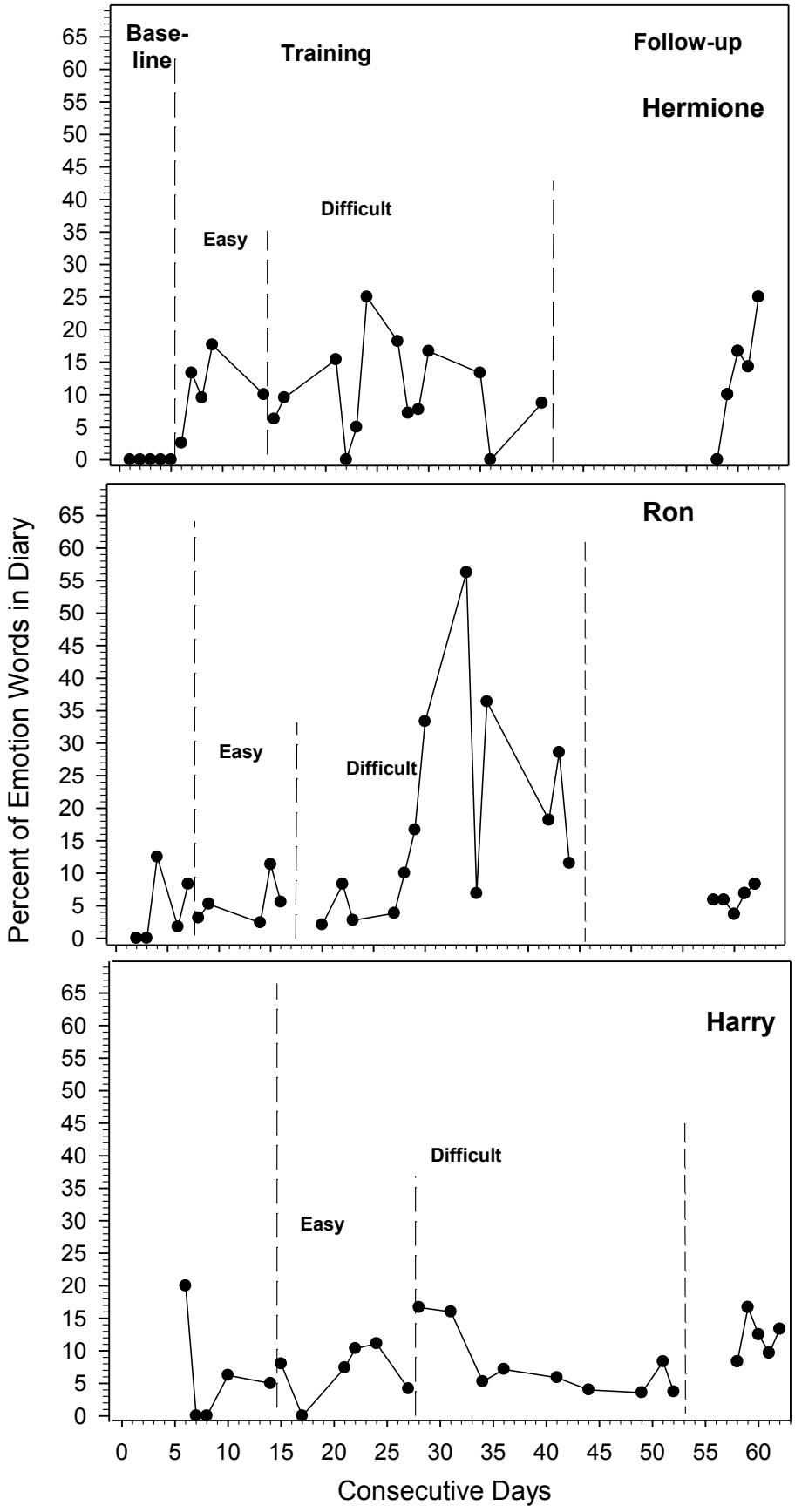

Figure 6. Percentage of emotion words of the total number of words recorded in diary entries across consecutive days.

When data on the percent of emotion words used in the diaries was plotted (Figure 6), an intervention effect for Hermione is shown by the increase in the number of emotional words she wrote, however the increased use of emotion words was relatively variable. Use of emotion words appeared to be maintained at follow-up apart from in the first follow-up session where she did not write any emotional words. After the first several sessions of the difficult level, Ron increased the number of emotional words that he used. This was not maintained at follow-up, however, the variability of the number of words used decreased. Harry's production of emotional words was variable and no clear effect is visible in Figure 6. It is clear though that the number of emotional words he used at follow-up was above that of the levels evident at baseline.

Descriptive explanation of diary entries.

Hermione.

Baseline. On day 1 Hermione reported that she had been writing character descriptions for a story she was writing in school. She found this fun and it made her feel "between excited and not very excited". In the remainder of the baseline sessions Hermione had minimal response to diary questions and said "nothing happened".

Intervention. During the first third of the intervention sessions she wrote about conflicts and frustration with her sister, "my sister was talking too loud" (day 8) and expressed frustration with her, "shuhhh!!!" and reported that she felt "annoyed" with her. One time she felt "angry" (day 6) with her another time she was "nervous" (day 15) as she asked her to be in a play, other times she was "happy" (day 7) with her, and they watched a movie together. On day 10 no one cheered for her in athletics, which made her, feel "angry and sad". During the intervention phase she also wrote about several cases of bullying, "Draco called me a spaz" (day 15). In this instance

Hermione told him to “stop it” and reported feeling “sad” and “angry”. Another time two boys were copying her, to which she told them to “just shush!” this made her feel “angry and sad”. In all cases Hermione’s way of dealing with bullying was to write to her teacher about it. A third of the way through the intervention Hermione got a pet cat, which she wrote about for the rest of the sessions more often than not. She wrote about brushing her cat (day 23), which made her feel “happy” and “soothed”. Another time she wrote her cat waking her up at 12:59 a.m. (day 30), which made her feel “cranky”. On day 28 a boy told her off for staring at him, which made her feel “angry”.

Follow-up. On the first follow up entry she wrote about how her teacher had spoken to her class about Hermione’s “Asperger’s and my problems” (day 58) and reported that this made her feel “like I had no weights on my shoulders”. On day 59 she wrote about how a girl called her blind, which made her feel “angry”. On day 60 she wrote about doing maths in school, which made her feel “calm”. On day 61 she wrote about how another child called her a “duh’!” this made her feel “sad” and “angry”. Again, she dealt with this by writing to her teacher about it On the last follow up session, she wrote about how she lost the school triathlon and reported feeling “disappointed and annoyed” (day 62) with herself.

Table 8 below displays the emotion words Hermione used, and the number of times she used them, during each phase of the study. Emotion words not taught in *MyFriendQuest* are bolded.

Table 8

Emotion Words Used and Number of Times Used in Diary Entries by Hermione

Baseline		Intervention		Follow-Up	
Word	Number	Word	Number	Word	Number
Excited	2	Happy	6	**Annoyed**	1
		Shush!	4	**Calm**	1
		Angry	4	Angry	1
		Annoyed	2	Disappointed	1
		Grr	2	Sad	1
		Excited	2		
		Sad	2		
		Argh	1		
		Calm	1		
		Cozy	1		
		Cranky	1		
		Soothed	1		
		Weird	1		
		Nervous	1		

Summary. Hermione went from not writing anything in her diary to writing complex self-reflections. She began using the diary to express how she felt about bullying and her pet cat. Hermione used emotion words, which were not previously used during baseline or taught inside the program. She continued to use words both taught and not taught at follow-up.

Ron.

Baseline. Ron almost always wrote about what he did at lunchtime (as the sessions with him were always after lunch). If the library was closed this made him feel "sad" (day 6) and he would stand by a tree (day 3). It was reported by his teacher that he would become upset to the point of tears when the library was closed. Ron also wrote about athletics practice, which he found "boring" (day 7). When he had athletics practice he reported that he "tried to cheer himself up" (day 7), for example, by getting his friend Sam to listen. In the fifth baseline session, he wrote about athletics practice again and reported feeling "more encouraged this time" (day 8) and thought "come on Ron you can do this".

Intervention. In the intervention phase Ron continued to write about athletics practice. In the second intervention session he reported that he was pretty good at it (athletics) and that he felt "good" (day 9). On day 20, he reported feeling "really excited" as the library was open and that he was sure that athletics would be easy (day 20). When the library was closed he reported that the day went a little downhill nearing the end (day 9) and felt "disappointed" (day 14) "sad" (day 15), and "bored" (day 42).

Follow-up. In the first follow-up session (day 58) he said that the library was closed but knew it was going to be anyway so played outside. If the library was open Ron would report that he felt "happy" (day 22). Ron would often write about what he was doing in school, for example working on logos for the school fair (day 16), and about how he "enjoyed" working with Sam (day 61), and that it was "fun" working with Sam.

Table 9 below displays the emotion words Ron used, and the number of times he used them, during each phase of the study. Emotion words not taught in *MyFriendQuest* are bolded.

Table 9

Emotion Words Used and Number of Times Used in Diary Entries by Ron

Baseline		Intervention		Follow-Up	
Word	Number	Word	Number	Word	Number
Great	2	**Yay**	10	**Average**	2
Sad	1	Happy	10	**Good**	2
Bored	1	**Lol**	8	**Great**	2
		Bored	6	**Inspired**	1
		Good	2	Happy	1
		Rofl	2		
		Excited	2		
		Sad	2		
		Enjoyed	1		
		Great	1		
		Reluctant	1		
		Woohoo!	1		
		Disappointed	1		

Summary. From Table 8 it is clear that Ron went from using descriptive emotion words e.g., "sad" to using more expressive language like "Woohoo!" and internet slang such as "lol". Ron used eight words during the intervention, which were not taught in *MyFriendQuest*, including complex emotion words such as "reluctant". During follow up he also used a complex emotion word, "inspired". Ron was able to use his diary to illustrate his problem solving processes, for example in

how he was able to motivate himself for athletics and what activities he could do if the library was closed.

Harry.

Baseline. Harry would almost always report that "the school is having fun" when asked "what happened?" in the diary. Harry would tell the researcher about the school work he had been doing that day and who had been helping him.

Intervention. Harry preferred the researcher to type in his diary entries for him while he dictated to the researcher. On day 15 he said he felt "sad" as he lost a toy of his. He attempted to solve this problem by continuing to look for it and having his mother and brother help him. On day 21, he fell over which made him feel "sad", he was able to ask someone for help. There were many other occasions where Harry was able to ask for help when he was struck with a problem, which showed that he had some problem solving skills. On day 28 he reported that he had been doing work and that it was a little bit hard but that it made him feel "happy". He had a friend help him.

Follow-up. In the follow-up sessions Harry reported that a girl was annoying him "Sarah is doing tricks on me, I don't like her any more, she is annoying" (day 58). He reported, "I don't like Sarah she is mean" (day 61) and that she made him feel "embarrassed". He dealt with her by telling his teacher aid or by running away. These were the only times where he opened up about a negative event.

Table 10 below displays the emotion words Harry used, and the number of times he used them, during each phase of the study. Emotion words not taught in *MyFriendQuest* are bolded.

Table 10

Emotion Words Used and Number of Times Used in Diary Entries by Harry

Baseline		Intervention		Follow-Up	
Word	Number	Word	Number	Word	Number
Happy	4	Excited	8	Annoying	3
Tired	1	Happy	8	Happy	2
		Good	3	Interested	2
		Interested	3	Embarrassed	1
		Sad	3	Excited	1
		Nervous	2	Sad	1

Summary. Table 9 shows that Harry modestly increased the number and variety of emotion words he used once the intervention was in place. Harry went from simply reporting about what he had been doing at school that morning and how that made him feel, to expressing how he felt about more personal events, e.g., the girl who was annoying him.

Naturalistic Observations

In the naturalistic observations five behaviours were observed, namely expressing emotion, initiating conversation, maintaining interaction, initiating play and watching. Figure 7 displays the number of intervals where expressions of emotion were observed.

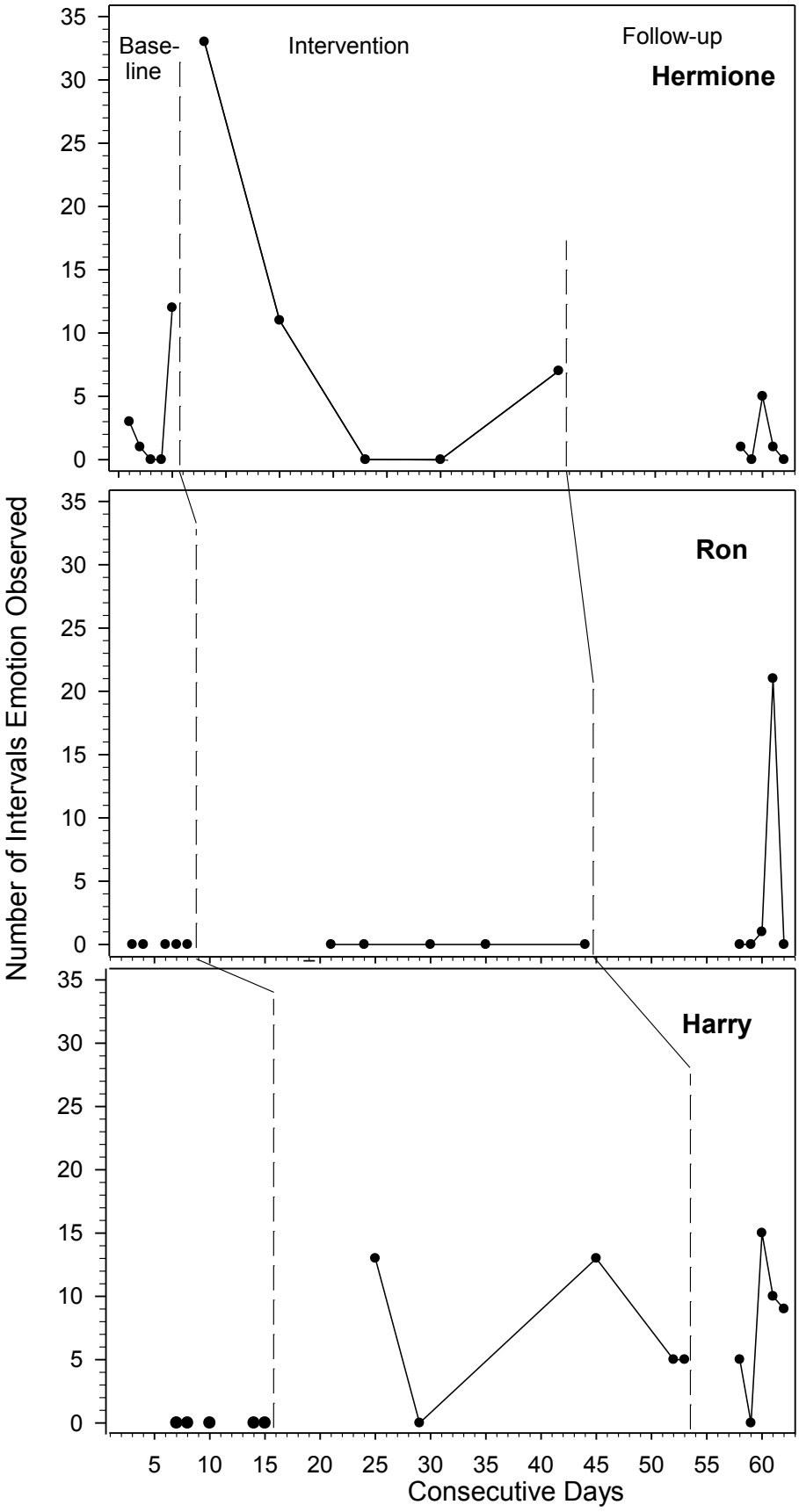

Figure 7. Number of school observation intervals where emotion was observed.

The number of intervals where emotion was observed for Hermione was variable, especially during the intervention, though this was less variable at follow-up. Ron did not display any emotion apart from one session during follow-up where he was playing a pushing game with a peer. There was an intervention effect for Harry, as little emotion was expressed during baseline, but this increased during the intervention and was maintained at follow-up.

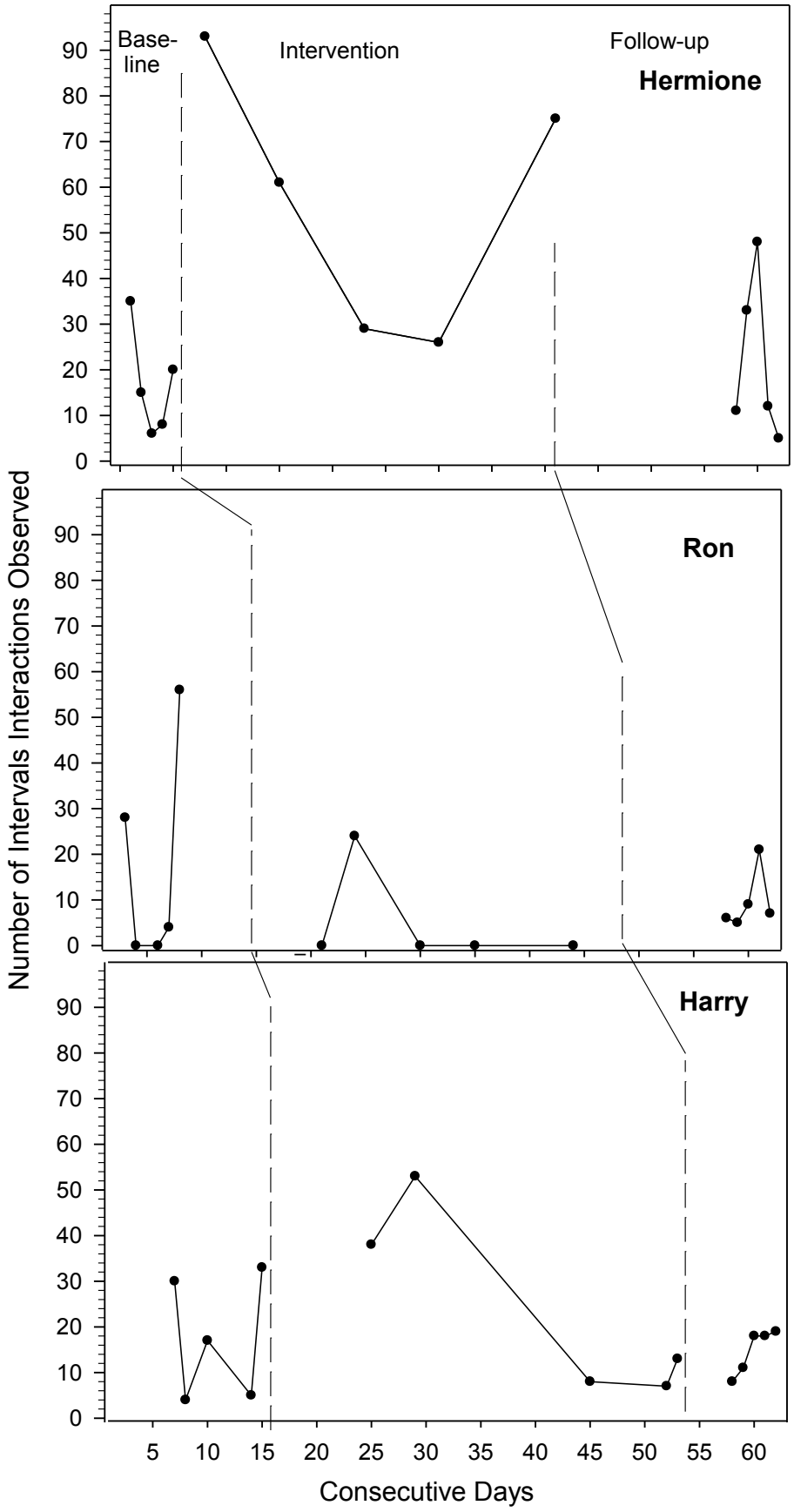

Figure 8. Number of intervals where maintenance of interactions were observed.

Figure 8 shows an intervention effect for Hermione but this was not sustained at follow up. During baseline and follow-up Ron had few sessions where he maintained interaction. However during follow-up he had some level of maintaining interaction each session he was observed. Harry's results were variable during baseline and follow-up; there was less variance at follow-up.

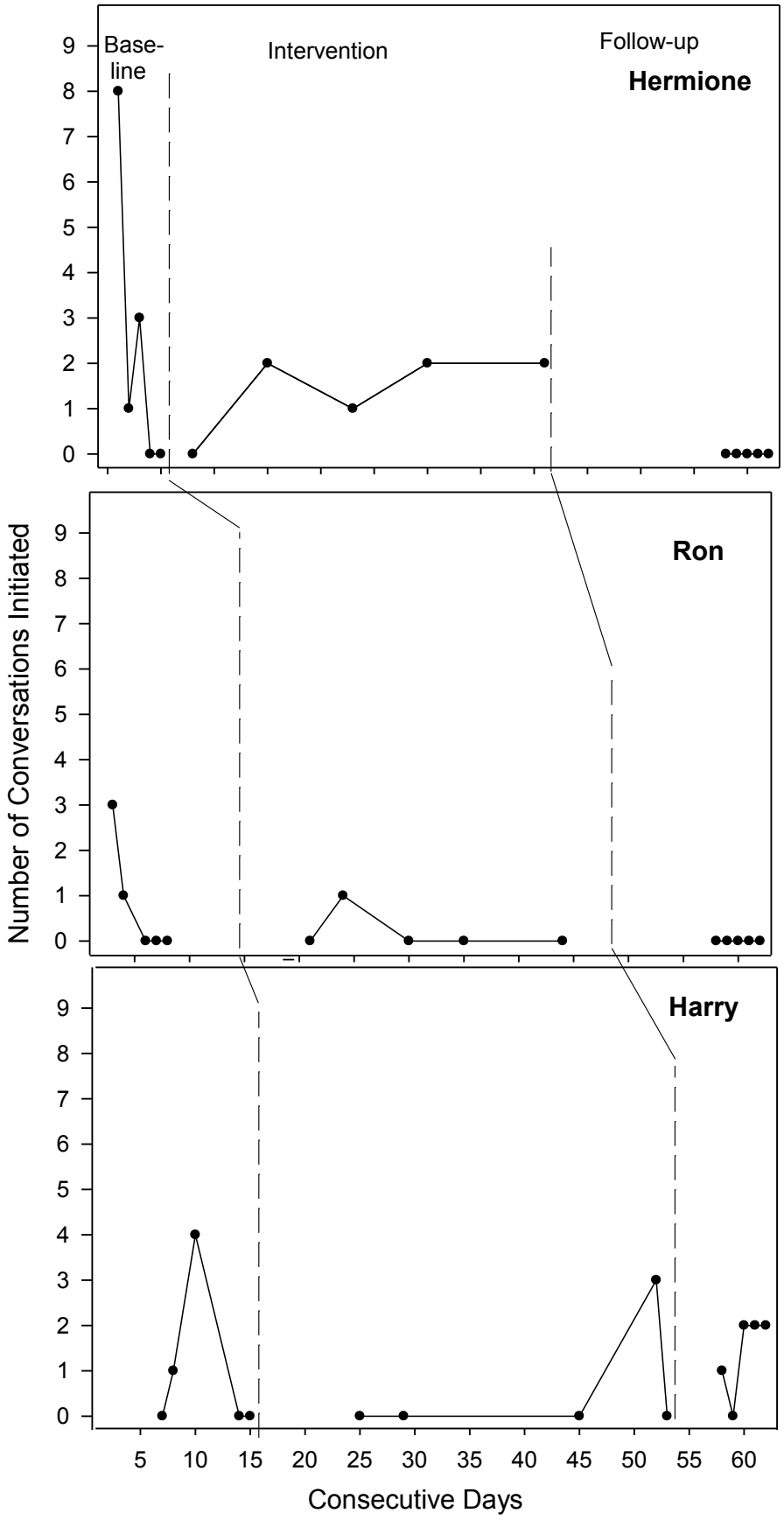

Figure 9. Number of intervals where initiation of conversation was observed.

Figure 9 shows a slight intervention effect for Hermione, however this was not sustained at follow-up in that follow-up data points were lower than those for baseline. There is no clear effect for Ron given that he initiated a total of four conversations during baseline, one during the intervention and then none during follow-up. For Harry there could have been a delayed intervention effect as near the end of the intervention period he initiated three conversations then during follow-up he began consistently initiating a few conversations per session.

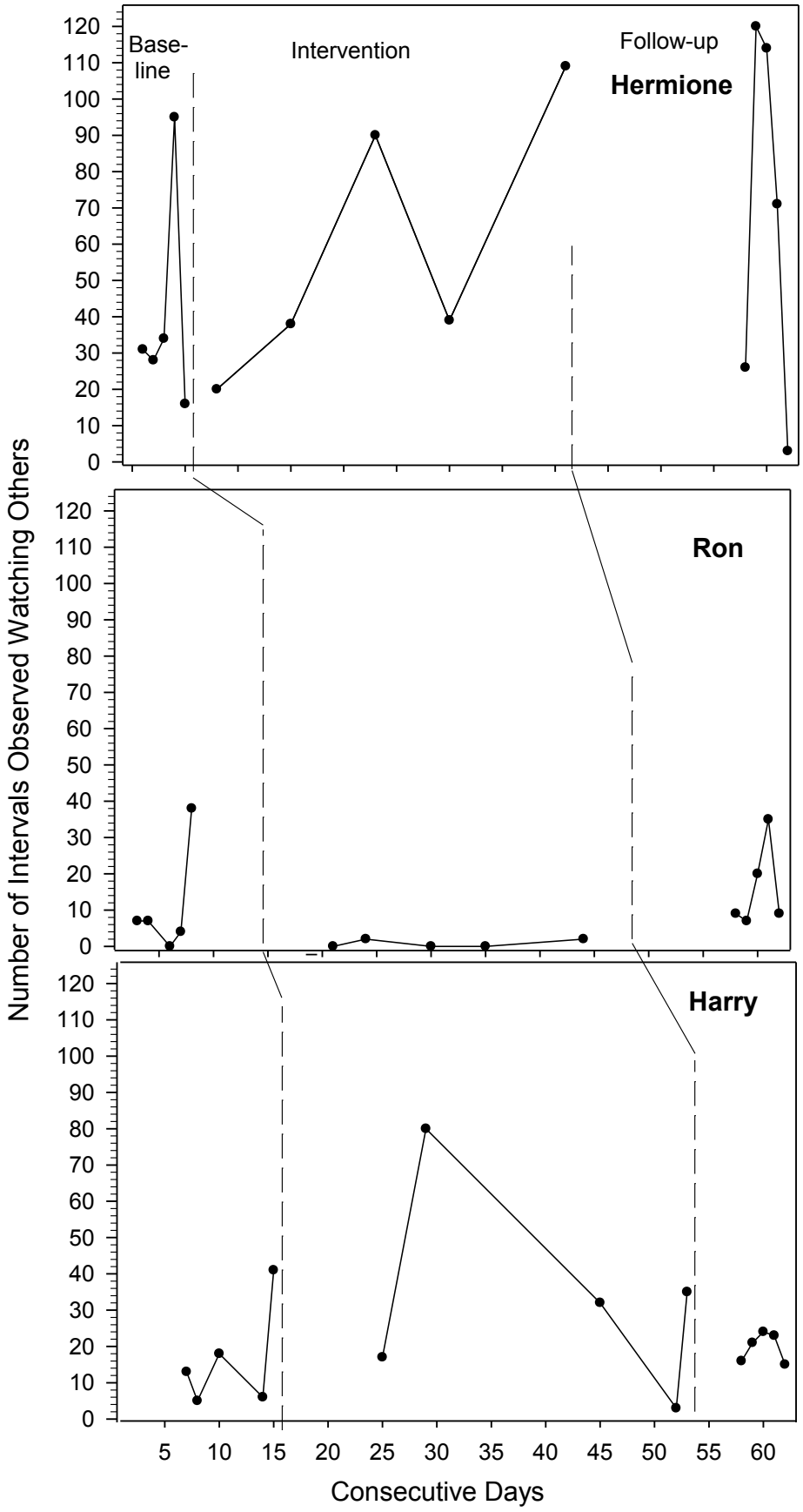

Figure 10. Number of intervals where observed to be watching others.

Figure 10 shows an intervention effect for Hermione, as it appears that there was an increasing likelihood of her watching others. Ron had an increased number of intervals where he watched others during follow-up. There may be a small intervention effect for Harry; however this decreased during follow-up, though there was little variability and the level of watching others was above the average rate at baseline.

Initiating play. Data was also recorded on initiating play however this is not presented graphically as the results were minimal. Hermione initiated play during the baseline phase but not during the intervention or follow-up. Hermione joined in rather than initiated play e.g., if she was not in the library then she would join in a game of handball rather than initiate a new type of play. Ron never initiated play. He was always reading in the library or sitting on the field on his own. There was one occasion where he was playing a "like/dislike" game with a cats and dogs book with two other boys and another time a pushing game with another boy. Harry initiated play once during the intervention period. Harry was also observed to join in play, e.g., tag, occasionally.

Summary of observations. During the observations for Hermione where she was in the library, the researcher sat on a couch. Hermione could see the researcher. When Hermione was playing handball, the researcher sat on a bench, which was within 15-20m of the playground and handball courts. Hermione rarely looked at the researcher. During the observations for Ron the researcher sat on a chair in the library, on the few occasions where he was outside the researcher stood on the school field. Ron would look at the researcher when he noticed that they had arrived, and would sometimes say *"Hi"*. During the observations for Harry the researcher stood or sat outside the classroom on the veranda. Harry moved around a lot so the researcher

would have to follow him at times. Harry would often say *"Hello"* or *"Goodbye"* to the researcher during the observations.

The intervention only had an effect on some modalities of social behaviour and for some participants. It was also evident that the behaviours maintaining interaction, initiating conversations, and watching were already in participant's repertoires as there was evidence of them during baseline. However, the intervention appeared to empower the participants to perform these behaviours more often. Expressing emotion was not present in Ron's repertoire until follow-up, and was not present in Harry's repertoire until the intervention was in place.

Quantitative Data from Parent and Teacher Interviews

As a different scale was used for the SRS than prescribed in the manual, scores were converted. The scale in the SRS manual ranges from 1 – *not true*, 2 – *somewhat true*, 3 – *often true*, to 4 – *almost always true*, 1 became 1, 2 became 2.5, and 3 became 4. As not all items from subscales were used from the SRS, they cannot be compared to normative or clinical cut-off scores. The *T*-scores normally calculated from the SRS also cannot be computed.

Hermione. Table 10 displays Hermione's pre and post parent and teacher SDQ and SRS scores.

Table 11

Pre and Post Parent and Teacher SDQ and SRS Raw Scores for Hermione

	Parent		Teacher	
	Pre	Post	Pre	Post
SDQ				
Peer Problems	8	7.5	9	8
Prosocial	7	4	2	7
Impact of Difficulties	8	7	2	4
SRS				
Social Awareness	20	24	26	26
Social Cognition	13.5	15	15	13.5
Social Communication	49.5	49.5	66	51
Social Motivation	18.5	20	19	20.5

SDQ. On three SDQ measures of parent-rated social behaviour, Hermione improved on two and also on two teacher reported measures. The difference between the two informants was on the prosocial and impact of difficulties sub scales. The particular items from the prosocial scale which the parent and teacher differed on were *"Considerate of other people's feelings", "Shares readily with other children (treats, toys, pencils, etc.)"*, and *"Often volunteers to help others (parents, teachers, other children)"*. Hermione's teacher indicated that she had improved on these items which could be because there would be more opportunities at school to be considerate of others feelings, share with other children, and volunteer to help. In addition *AssistedMyFriendQuest* was used in the school environment. Interestingly, Hermione's teacher indicated that the impact of her difficulties had become more

severe. This could have been because Hermione wrote letters to her teacher when she was bullied, and as she had become more expressive in her diary entries, perhaps this also occurred in her letters to her teacher. All of Hermione's scores were above the clinical cut-off (see Table 4).

SRS. On three SRS measures of parent-rated social behaviour Hermione deteriorated on three and on one teacher reported. She improved on two teacher-rated measures of social behaviour. The difference between informants was on the social awareness and social communication sub scales where her teacher did not indicate deterioration in behaviour. Her teacher indicated the same pre-intervention level of social awareness and indicated that her social cognition had improved, which again could have been to do with the letters Hermione sent her in addition to seeing her communicate with the friend she had made.

Ron. Table 12 displays Ron's pre and post parent and teacher SDQ and SRS scores.

Table 12

Pre and Post Parent and Teacher SDQ and SRS Raw Scores for Ron

	Parent		Teacher	
	Pre	Post	Pre	Post
SDQ				
Peer Problems	8	9	6	7
Prosocial	6	5	4	3
Impact of Difficulties	3	5	4	2
SRS				
Social Awareness	23	24.5	23	23
Social Cognition	16.5	16.5	19.5	15.5
Social Communication	57	54	55.5	51
Social Motivation	17	18.5	21	19

SDQ. On three SDQ measures of parent-rated social behaviour, Ron improved on zero but improved on one teacher reported measure, namely on the impact of his difficulties. This could have been because his mother explained that he had recently had an incident at home where he ran across the road in an attempt to hurt himself in a state of frustration at himself for spilling milk in the kitchen. As Ron made friends, this could explain the reported decrease in impact of his difficulties by his teacher in addition to gaining more acquaintances, participating more in group work and physical activity, and requiring less guidance with his school work. Ron's post-intervention clinical cut-off scores were all abnormal apart from his parent rating prosocial score, which was borderline.

SRS. On four SRS measures of parent-rated social behaviour, Ron improved on one and on three teacher-rated measures. Both his parent and teacher reported improvements in Ron's social communication but only his teacher reported that he had improved in his social cognition and social motivation. This may have been

because he had made friends and took part more in group activities, both of which may indicate improvements in social behaviour.

Harry. Table 13 displays Harry's pre and post parent and teacher SDQ and SRS scores.

Table 13

Pre and Post Parent and Teacher SDQ and SRS Raw Scores for Harry

	Parent		Teacher	
	Pre	Post	Pre	Post
SDQ				
Peer Problems	7	5	6	3
Prosocial	8	8	6	7
Impact of Difficulties	7	6	3	2
SRS				
Social Awareness	18.5	17	21.5	24.5
Social Cognition	18	13.5	9	12
Social Communication	46.5	48	49.5	48
Social Motivation	18.5	18.5	16	19

SDQ. On three SDQ measures of parent-rated social behaviour Harry improved on two and on three teacher rated measures. The difference between the two informants was on the prosocial scale, on the item *"Shares readily with other children"*, where his parent rated him more favorably. His teacher had explained that he did share, but there were some items that were special to him, which he would not share. All of Harry's post-intervention ratings were abnormal (above the clinical cut-off) apart from his parent and teacher ratings of prosocial behaviour and his post teacher peer problems rating.

SRS. On four SRS measures of parent-rated social behaviour Harry improved on two and one teacher-reported measure. His parent reported that he had improved on the sub scale of social anxiety and social communication while his teacher indicated that his social cognition had improved. This could be explained by his parent seeing him take part in after school activities (karate). The improvement in social cognition was small, but was due to improvements on the items responding appropriately to mood changes in others, answering questions directly rather than talking about the subject and talking in a robot voice.

CBCL

Hermione.

Pre-interview.

Parent. Hermione's mother commented that she did not have any close friends and did not see any friends outside of school. She had in the past, however, had children over but they would always end up playing with Hermione's younger sister as Hermione would go and read by herself if she could not cope. Therefore her mother said that her going off to read alone may not be by choice. Hermione was said to not understand the give and take of friendships. However, she was described as being persistent in her attempts to be social, even though her efforts were not always successful. Hermione did not play, and if she did it was very rule based. She had expressed that she wanted to play handball.

Teacher. Hermione's teacher said she did not have any close friends. She suggested that other children did not understand her. Hermione could not read body language; she did not understand the connection between body language and another's emotions. Because of this she would give a blank face and shrug her shoulders in response to others. She also did not understand why people say things, and other children did not understand where she was coming from in conversations.

Hermione played at a significantly lower level than her peers. She was dependent on her teacher to help her get into a group when the class was doing group work.

Researcher observations. From what the researcher gathered from the parent and teacher, Hermione did not appear to have any friends. Hermione could talk to other children but could not make the next step to forming a friendship. Hermione had the capacity to play, but only rule-based games, for example board games and video games.

Post-interview.

Parent. At the post interventions interview, Hermione had begun to play with children at sports outside of school, for example tennis and swimming. She played with children at tennis and swimming and had regular children who she spoke to, but going to their houses would be the next step, which she had not got to yet. She was good at games with rules, but she was not good at imaginative play. She did not play in the same way as other children, and had to have a plan for what she was doing set out before it would begin. She had begun to play handball more often.

Teacher. Her teacher had noticed that Hermione was interacting with her peers more. She also reported that there was one girl who Hermione began to spend her time with often and had become a friend. Hermione played at a level one-two years younger than her age. Her ability to participate in physical education improved, as she moved into free spaces in sports games. She also improved in her ability to work in groups. She still struggled with noises and relied on her teacher to help her finish her work.

Researcher observations. There was a boy whom Hermione frequently talked to outside the library while they ate their morning snack and they would occasionally talk inside the library and read books together. Hermione considered him “sort of” a

friend. In the latter half of the study, Hermione was seen talking to a girl from a different class often, they would also play clapping games, play on the jungle gym, and play handball together. Hermione considered her to be a friend, therefore from the researcher's observations. Hermione appeared to be able to play similarly to children her age.

Ron.

Pre-interview.

Parent. Ron did not have any close friends and did not see children outside of school. Any relationships he had with other children were said to not be reciprocal. Ron did not know how to make friends or be a friend. The way he behaved with his mother was not age appropriate, as he would throw tantrums if he did not get his own way. In commenting on his ability to play compared to other children his age, his mother said that he did not play well and had a short attention span, as he was only interested in an activity for five minutes.

Teacher. Ron had three friends, and was said to develop friendships quickly this year. He sought out friends who were interested in what he was. These were close friends, but not close enough to go to each other's houses. He was said to be "perfectly capable of introducing himself and talking to others". He did not play at all outside of the classroom and would usually sit on his own as this was his break time. His ability to work alone was not good when compared to other children his age. He was said to be difficult to teach as he was in his own world, distracted and fidgety. He did different work in school to classmates and would often get distracted telling his friends what he was doing. He was unaware of certain times to talk and not talk, for example he would speak out in test situations.

Researcher observations. From what the researcher gathered, Ron did have friends, but they were not close enough to go to each other's houses. They also did not interact at interval or lunchtimes, they only worked together and talked during class time and worked on school work together. Ron did not play. His ability to work in school was not good at times as he was distracted, and would write about the things that he wanted to write about, (e.g., example tanks, cats and dogs) instead of the set topic.

Post-interview.

Parent. His mother said that he had a lot of acquaintances and a few friends, though his mother commented that he was not interested in making friends. Of his behaviour in comparison to other children she commented that "it is like having a seven year old", in terms of his life skills and consequences. His play was solitary and he liked to be alone.

Teacher. Ron's circle of friends had grown to five. She had seen him playing with a group of children at lunch and other times he was seen sitting with a group of boys. He chose friends who were interested in what he also liked, and was comfortable making friends. He would only talk about his own interests and not ask the other children about their interests and he would join in conversations if he overheard something that he was interested in. He was comfortable introducing himself to other people. He did not play well and children would have to get to know him before he would play with or talk to them. Ron had become more involved in group activities and did not need the teacher to stand by him anymore, while in the past she needed to prompt him. He also did not need to be reminded to be on task as much, but still needed some level of refocusing and dealing with his disorganization.

Researcher observations. Ron was observed to interact with several boys who were his friends; however they did not play together at lunch. These observations were made when arriving before the sessions with Ron began and afterwards whilst talking to his teacher. Ron was friendly when another child was interested in what he was interested in. He was only observed to play once during the observations.

Harry.

Pre-interview.

Parent. Harry's mother said that he did not have any close friends and did not see anyone outside of school. Harry was said to be overly friendly and would occasionally, unintentionally "scare kids". He would also hug people when it was inappropriate. On a more positive note, she said that his classmates liked him, and protected him, and that because of this he was popular. In comparison to other children his age he played similarly to them. She said that it was hard to get him to focus when commenting on his ability to work along. He never stayed on task and she had to help him.

Teacher. He had one friend; nevertheless she rated his ability to make friends as "good". He had begun to mix more with other children as this was an area that had been worked on. His ability to play was "right up there". However, he often played tag, but did not want to be touched and would get upset about this. When playing sports he would not know where to go. His ability to stay on task was said to be good but he could stare into space. His behavior was often at a level below his age, he would have tantrums, and meltdowns.

Researcher observations. The impression gathered from the pre-interviews was that Harry did not have any friends apart from one, but was well liked by other

children. Harry was able to play at the same level as other children his age. He could work along okay but required prompting.

Post-interview.

Parent. Harry had one or two close friends. His mother considered him to still be overly friendly. He played differently to other children, for example he lined his toys up instead of actually playing with them. He had begun to participate more in physical education, and in karate from beginning to end of sessions. This had surprised her because in the past he was not interested and would only participate for the first five minutes.

Teacher. His teacher said that he had about three friends. He needed guidelines when playing. There was one girl in the class who Harry could not stand, but was doing better in his plans (saying what he is going to do and who with) set out before each lunchtime however these plans fell down when this girl interfered. He was also becoming more physical and aggressive in the last term. He had begun to take part more in physical education, and took part in everything really well on sports day which surprised his teacher. He still required prompting with his school work to keep him on task.

Researcher. Harry was well liked by his peers and had a group of several boys who he preferred to choose to play with at lunch time. His ability to play was similar to other children his age.

Quantitative Participant Interview Data

There were not enough items included from the RCMAS and FQQ to compare them to normative data. Any changes in scores pre and post intervention are noted. An increase in RCMAS scores indicates a greater level of anxiety, while lower levels indicate lesser levels of anxiety. For the FQQ scale increasing scores indicates greater

friendship quality and decreasing scores indicate poorer friendship quality, except for the conflict and betrayal subscale where an increase indicates poorer friendship quality and a decrease indicates better friendship quality. As different scales were used for the RCMAS and FQQ than the ones prescribed, scores were converted. The scale used for the RCMAS can be seen in Appendix N. Faces 'A' to 'C' became 'Yes (1)', faces 'E' to 'G' became 'No (0)'. If the response was 'D' then extra explanation provided by the participant was used to determine whether the response should be 'Yes' or 'No'. For the FQQ an 8-point scale, which ranged from 0 – *not at all* to 7 - *a lot* was used. When converting scores back to the prescribed FQQ scale, 0 stayed as 0, 1 and 2 became 1, 3 and 4 became 2, 5 and 6 became 3, and 7 became 4.

Hermione. Table 14 displays Hermione's pre and post intervention RCMAS and FQQ scores. During Hermione's post-intervention interviews, she insisted that she write in her answers herself.

Table 14

Pre and Post Intervention RCMAS and FQQ Raw Scores for Hermione

	Pre	Post
RCMAS		
Social Anxiety	6	8
Worry	3	4
FQQ		
Validation and Caring	12.5	7
Conflict and Betrayal	18.5	5
Help and Guidance	8.5	3
Companionship and Recreation	2	9
Intimate Exchange	5.5	1

RCMAS. On two RCMAS measures of participant-rated anxiety, Hermione declined on two. This may be due to Hermione's improvement in expression and awareness of her emotions.

FQQ. On five measures of participant-rated friendship quality, Hermione's best friendship improved on two. There was less conflict and betrayal in her best friendship, and more companionship and recreation. It is important to note again here that in the pre-intervention interviews, Hermione answered FQQ questions with reference to her sister. However in the post-intervention interview, Hermione had made a new best friend at school. Therefore differences in friendship quality are difficult to determine due to them being answered with respect to different individuals of which she had known for different amounts of time.

Ron. Table 15 displays Ron's pre and post intervention RCMAS and FQQ scores.

Table 15

Pre and Post Intervention RCMAS and FQQ Raw Scores for Ron

	Pre	Post
RCMAS		
Social Anxiety	3	3
Worry	1	0
FQQ		
Validation and Caring	24.5	15
Conflict and Betrayal	11.5	2
Help and Guidance	20.5	8
Companionship and Recreation	10	7
Intimate Exchange	1	2

RCMAS. On two RCMAS measures of participant-rated anxiety, Ron improved on one and he rated himself as being less worried.

FQQ. On five measures of participant-rated friendship quality, Ron's best friendship improved on two. There appeared to be less conflict and betrayal and more intimate exchange.

Harry. Table 16 displays Harry's pre and post intervention RCMAS and FQQ scores.

Table 16

Pre and Post Intervention RCMAS and FQQ Raw Scores for Harry

	Pre	Post
RCMAS		
Social Anxiety	5	1
Worry	5	3
FQQ		
Validation and Caring	21	21
Conflict and Betrayal	14	10
Help and Guidance	20	20
Companionship and Recreation	8	11
Intimate Exchange	12	4

RCMAS. On two RCMAS measures of participant-rated anxiety, Harry improved on two and rating himself as being less socially anxious and worried.

FQQ. On five measures of participant-rated friendship quality, Harry's best friendship improved on two. There was less conflict and betrayal and more companionship and recreation.

Summary. Ron and Harry both experienced a decrease in worry. The results for the FQQ across participants overall demonstrate that the quality of their friendship appeared to decrease. This is inconsistent with the results found when interviewing the participants. When asked if their relationships with their best friend had improved, Hermione said "sort of", Ron said "Yes because I can understand their point of view and they understand mine. He understands my emotions more and he gets my point of

view" and Harry said "I like him more since playing the starfish game". When asked if their relationships with their classmates had improved Hermione said "not much", Ron said "I can recognize other people's emotions and they can recognize mine. I used to not be able to do the things above" and Harry said, "My buddy plan is going well".

There was one consistent positive result in that the quantity of conflict and betrayal decreased for all participants; most other areas of friendship appeared to deteroriate, however the qualitative data would suggest the opposite.

Program Acceptability

In the post intervention interviews participants were asked questions about what they thought of *AssistedMyFriendQuest*. Table 17 shows the qualitative questions and answers for each participant.

Table 17

Qualitative Acceptance of AssistedMyFriendQuest by Participants

Participant	What they Liked	What they Disliked	What Was Most Helpful	What they Learned
Hermione	That it helped me with emotions/body language.	It got boring eventually.	Don't know.	I found a few of the emotions hard but learned them eventually e.g., upset, disappointed.
Ron	Was quite cool. Looked cool.	The annoyingness of when I thought an emotion was right but it wasn't.	The way that I could use the help if I needed it.	I learnt to recognize other people's emotions.
Harry	Because it is happy.	-	That I liked this game	I learnt about lots of things.

Table 18 shows the quantitative questions and answers for each participant. These questions were answered on an 8-point scale from 0 – *not at all* to 7 – *a lot*.

Table 18

Qualitative Acceptance of AssistedMyFriendQuest by Participants

Participant	How much did you like MFQ?	How much did your ability to recognize emotions improve?	How much did your social skills improve?
Hermione	4	3	1
Ron	7	7	7
Harry	7	7	2

Overall from Tables 17 and 18 it is clear that participants liked the program and learned how to recognize others emotions.

Harry in particular seemed to especially enjoy *AssistedMyFriendQuest*. When the researcher arrived at his classroom, he would often say with a smile on his face "Are we playing the starfish game?". Ron was always motivated to get through all of the emotion scenarios.

Summary of Results for Each Participant

Hermione. Firstly, in referring to the quantitative results for Hermione, her largest improvements were on her teacher-rated prosocial skills and social cognition skills. Her largest decreases were on her parent rated prosocial skills, and parent rated social awareness skills. When Hermione rated her own anxiety levels, she decreased on both the social anxiety and worry subscales. Hermione's best friendship had a large improvement on the conflict and betrayal and companionship and recreation subscales.

For Hermione, the introduction of using *AssistedMyFriendQuest* resulted in an increase in emotion recognition ability in Assisted*MyFriendQuest.* Improvements in

emotional skills were further shown though an improvement in emotional expression through diary entries. She also began using words not taught in *AssistedMyFriendQuest* in her diary. Impressively, Hermione progressed to writing complex self-reflections e.g., “it was like a weight off my shoulders”. *AssistedMyFriendQuest* also appeared to have an effect on her social skills. She began participating in group activities more. Instead of always going to the library at interval she played handball with her peers, and she made a friend.

Ron. Firstly, in referring to the quantitative results for Ron, one of his largest improvements was on his teacher's rating of the impact of his difficulties, this was also where his parent rated that he had deteriorated. Both his parent and teacher reported that Ron's social communication skills had improved. Ron rated himself as being less worried, post-intervention. His best friendship improved con the conflict and betrayal and intimate exchange subscales.

For Ron, the introduction of using *AssistedMyFriendQuest* resulted in an increase in emotion recognition ability in *AssistedMyFriendQuest.* It was apparent that this ability had generalized as he reported, “I can recognize people’s emotions better and they can recognize mine”. He also had an improvement in emotional expression through diary entries and used emotion words not taught in *AssistedMyFriendQuest*. There was also an effect on his social skills. He began participating in physical education and group activities more, and took a leadership role in a group project. He made more acquaintances and friends and reported that the quality of his best friendship had improved. His teacher and mother also expressed that he had more friends.

Harry. Firstly, in referring to the quantitative results for Harry, one of his largest improvements was on his teacher's rating of peer problems, his parent ratings

of social anxiety, and social communication improved, while his teacher indicated that his social cognition had improved. Harry rated himself as being less socially anxious and worried. His best friendship improved on the subscales of conflict and betrayal and companionship and recreation.

For Harry, the introduction of using *AssistedMyFriendQuest* resulted in an increase in emotion recognition ability in *AssistedMyFriendQuest* and in his in-classroom emotion picture communication system he used. He became more expressive in his diary, and gave descriptive information about how he felt about personal events. His social skills also improved, he began participating in physical education and after school activities more. He also made more friends as reported by all informants.

CHAPTER FIVE: DISCUSSION

In this discussion, the results are summarized and interpreted separately for emotional and social skills. The program acceptability of *AssistedMyFriendQuest* is discussed. In addition, to implications for research, practice and program development are considered, limitations noted, and suggestions for future research made.

Summary and Interpretation

The aim of this study was to evaluate the effectiveness of a computer training program called *MyFriendQuest* on the emotion recognition and social skills of children with HFA/AS. Overall it was found that *AssistedMyFriendQuest* had a positive effect on the emotion recognition and social skills of participants as measured within the training program. Firstly, and most consistently, all participants showed improvements in emotion recognition as measured by the cumulative number of emotion examples completed per game (see Figure 4). Secondly, it was observed that *AssistedMyFriendQuest* had an effect on some modalities of social behaviour in the natural environment for some participants, suggesting some (albeit, inconsistent) generalization from training to natural settings. While quantitative parent and teacher interview results demonstrated variable findings, the qualitative findings from participants, parents and teachers was that overall, participant's emotional and social skills had improved. All informants provided anecdotal examples of their use of emotional and social skills. For example, Ron's mother reported that he had started to show empathy (e.g., saying sorry when upsetting his Mother), consistent with previous research which shows that individuals with ASDs have the potential to develop empathy (Dziobek, Rogers, Fleck, & Bahnemann, 2008). In addition, Ron became more involved in group activities at school, gained more acquaintances and friends. Hermione also began to participate more often and became more engaged in afterschool sports and made friends with a younger girl from another class. Harry

began to participate in physical education and in karate after school and made more friends. Note that all participants began to take more of a part in group activities, and gained one or more friends. These results were not found in or examined in previous computer intervention literature for ASDs. This suggests that *AssistedMyFriendQuest* may lead individuals to participate more in group activities and make friends. These results support the hypothesis that *AssistedMyFriendQuest* can improve emotion recognition and to an extent social skills. What is still un-determined is (a) how to make this outcome more consistent and widely generalized, and (b) how enduring the enhancement of social responsiveness and engagement is.

Emotional Skills

Over successive sessions, participants improved in their ability to complete emotion scenarios, reflecting an increase in emotion recognition skills. This finding is consistent with nine previous studies which have demonstrated improvements in emotion recognition following the use of a computer-intervention (Bolte et al., 2002; Golan & Baron-Cohen, 2006; Hopkins, Gower, Perez, Smith, Amthor, Casey Wimsatt, & Biasini, 2011b; Lacava et al., 2007; Lacava, Rankin, Mahlios, Cook, & Simpson, 2010; Silver & Oakes, 2001; Thomeer et al., 2011; Weinger & Depue, 2011). There was some evidence for generalization of this skill in participant's ability to recognize emotions in the *expression guessing game* and the *mute button guessing game*. In addition, all participants reported that they could recognize emotions in other people better since using the program. For example when asked what he had learnt from *AssistedMyFriendQuest*, Ron said *"I can recognize other people's emotions better and they can recognize mine"*. Harry's teacher also reported that he was recognizing emotions better and quicker. It is possible that participants were informing the researcher of what they thought the researcher wanted to hear (i.e., Hawthorne effect). However this is not all bad as this in itself would be evidence of

social skill. Given the possibility of participant's biases in telling the researcher what they wanted to hear, this should be considered in the design of future studies. Few previous studies provided a test of generalization for emotion recognition and when generalization was found it was limited (Golan & Baron-Cohen, 2006; Hopkins, Gower, Perez, Smith, Amthor, Casey Wimsatt, & Biasini, 2011a; Lacava et al., 2007; 2010; Thomeer et al., 2011) or non-existent (Bolte et al., 2002). Unlike these previous studies, which provided just one measure of generalization, the current study provided multiple measures (e.g., naturalistic observation, diary entries and anecdotal reports). Furthermore, the previous studies involved participants using computer programs for 2.5-20 hours (most studies were between 10-20 hours) of training time in total where as *AssistedMyFriendQuest* was used for just 5-6 hours in total and saw similar results for emotional and social skill improvements. In addition, a non-computer intervention that used CBT to facilitate social-emotional understanding and social interaction in HFA children found similar improvements to the current study (Baumringer, 2002). This intervention included a curriculum and teacher support, and the participants were similar in age to the current study (7-18 years old). A similar method of discussing social problem solving was also used. However, this intervention was carried out over the course of a whole seven months in comparison to the current study, which was six weeks. This may have been due to both *MyFriendQuest* and the individual facilitation (i.e., instead of following a general curriculum, participants received individualized support). In addition none of the cited studies included a follow-up period.

The proportion of emotion words used to other words used in participants' diary entries increased. In addition participants began using emotion words not taught in *MyFriendQuest* in their diaries. This demonstration of a general effect was a result not initially expected. This could have occurred via strengthening of the association networks related to emotion. Association Activation Theory (AAT) states that there

are networks in the brain which become automatically activated when one part of the network is stimulated e.g., when an individual thinks of the emotion *sad* this will automatically activate the emotion *upset* (Parkhurst, Shobe, & Kihlstrom, 2005). Thus association networks are formed by words or concepts that tend to go together. Words which are used more frequently gain the most associative strength, therefore it would be assumed that the emotion words taught in *AssistedMyFriendQuest* would be the most used in the diary entries, which upon re-examination of Tables 7-10 appeared to be the case. Studies have found that due to weak central coherence individuals with ASD have weak association networks due to a lack of understanding of semantic association and context (Beversdorf, Narayanan, Hillier, & Hughes, 2006; Beversdorf et al., 2000; Bowler, Gardiner, Grice, & Saavalainen, 2000). Therefore it is interesting that the one participant (Harry) who used just one emotion word not taught in *MyFriendQuest*, was the most severe on the ASD spectrum of the three participants, whereas Hermione and Ron began to use words not taught in *AssistedMyFriendQuest* almost as often as those taught, which could illustrate a strengthening of association networks.

Although the proportion of emotion words used increased in comparison to non-emotion words, this should be interpreted carefully. This is because there were more opportunities to include emotion words during the intervention due to there being more sessions during the intervention period (15-18 compared to five in the baseline and follow-up periods). Also, it could be argued that the participants had been primed for producing more emotion words during *AssistedMyFriendQuest.* However, this can also have been the case during the interviews during baseline and follow-up as the questions related to emotions and behaviour. Besides these factors, participants using emotion words not taught in *AssistedMyFriendQuest* is still a positive result.

Social Skills

This is the first study of computer-based intervention for ASD, which has incorporated CBT components through the use of social problem solving and diary entries. Over cumulative sessions there was a decrease in the number of incorrect answers to questions regarding what to do in social situations (social problem solving) for two of three participants. Two previous studies have successfully used computer interventions to improve social problem solving abilities in children with ASDs (Bernard-Opitz et al., 2001; Mitchell et al., 2006). Like the present study, both these studies were completed with the researcher or a trainer. (Bernard-Opitz et al., 2001) used a computer to present social problems to eight preschool children with autism. There was a selection of possible solutions in addition to the option for the participant to produce their own alternative solution. Each of the participants went through 10 training sessions in addition to six probe sessions. In the training sessions a trainer explained the solutions and animations of the solutions were provided. During probe sessions the solutions were not explained. There was an increase across probe sessions for solutions produced by seven of the eight children with autism. While Bernard-Optiz et al. (2001) had a greater number of replications across participants, they did not include a test of generalization, nor did they include a follow-up period. Therefore it cannot be determined if the skills learnt in the computer program transferred to the natural environment, and if the social skills learned were maintained. Mitchell et al. (2006) used a Virtual Environment representing a cafe. Six teenagers with ASD also watched three sets of videos of real cafes and buses and discussed where they would sit and why. Three of the participants used the Virtual Environment between the first and second sets of videos and the other three, between the second and third. Ten raters coded participant's decisions and explanations. There were 16 instances of significantly higher ratings of decision-making following use of the

Virtual Environment. While skills were generalized from the cafe context to the bus context, there was no test of generalization to the real-life environment in addition to no test of maintenance at follow-up. Unlike Bernard-Opitz et al. (2001) and Mitchell et al. (2006), the present study tested for and found evidence of generalization and maintenance of skill.

Although the observation results were positive overall, they are not as significant or enduring as predicted. Following the results from the naturalistic observations it appeared that *AssistedMyFriendQuest* only had an effect on some modalities of social behaviour and for some participants. The behaviours maintaining interaction, initiating conversations, and watching were already in participant's repertoires but during the intervention these behaviours were performed more often. Exceptions were that expressing emotion was not present in Ron's repertoire until follow-up, and was not present in Harry's repertoire until the intervention was in place. Therefore to an extent *AssistedMyFriendQuest* was able to facilitate use of these behaviours. This finding of social behaviour transferring into the natural environment following use of a computer intervention is consistent with the few previous studies which have included naturalistic observations (Hopkins, Gower, Perez, Smith, Amthor, Casey Wimsatt, & Biasini, 2011a; Simpson, Langone, & Ayres, 2004; Whalen et al., 2006) and for one of three participants in (Sansosti & Powell-Smith, 2008). However Lacava et al. (2010) did not conclude that improvements transferred into the natural environment. Other studies have neglected tests of transfer and generalization. The present study included multiple components to support generalization including the diary, the expression guessing game, mute button guessing game, variations game in addition to the program being used a school instead of in a laboratory setting.

The results from the parent and teacher questionnaires relating to SDQ and SRS ratings were mixed. Measures on some subscales appeared to increase, while others decreased. In addition the ratings between parents and teachers varied. When analyzing these ratings it appeared that overall, participants' functioning on these measures had decreased. However this was inconsistent with the overall qualitative message received from parents and teachers. The decrease in SDQ and SRS ratings by parents and teachers is inconsistent with previous literature where they have been used in similar studies using computer interventions. Thomeer et al. (2011) found significant differences between pre- and post-test SRS ratings by parents. Their descriptive data showed that 9 of 11 children with HFA had improved SRS scores. A study using another other parent and teacher report method (Social Skills Questionnaire (Spence, 1995)) reported improvements (Beaumont & Sofronoff, 2008). Not all items from the quantitative measures (SDQ, SRS, RCMAS, FQQ, and LSDQ) were used. This limits the conclusions, which can be made about the results from these measures. Even though other studies (Thomeer et al., 2001; Spence, 1995; Beaumont & Sofronoff, 2008) have found clear improvements in SRS ratings and used all items from the measure, the present study has multiple measures of qualitative data to show similar improvements (e.g., interviews, diary entries, observation). The present study did not include all items in order to keep the length of the interviews with parents and teachers down to an hour. This aided in maintaining rapport.

Program Acceptability

All participants liked *AssistedMyFriendQuest* (see Tables 17-18), and reported that they learned about emotions, including recognition and for Hermione, body language. Ron was the only participant who thought *AssistedMyFriendQuest* helped him with his social skills. What they did not like was that it eventually became

repetitive, and when they found an emotion difficult. Other studies (Lacava et al.,2007; Whalen et al., 2006), have provided measures of program acceptability (or social validity). For example Lacava et al. (2007) used a checklist, which was given to participants, parents and teachers, pre-, and post intervention. Parents and teachers provided anecdotal evidence of skills the participants had learned and participants reported which part of the program (*Mind Reading: The Interactive Guide to Emotions*™) they liked. The participants reported liking the games in the program, however like *AssistedMyFriendQuest*, said the repetitious nature of the program became boring.

Implications

There are multiple implications for practice and research from this study. Firstly, an implication for practice is that *AssistedMyFriendQuest* is potentially useful in improving emotion recognition and social skills for children with HFA/AS. It also appears that incorporating a diary component into the intervention may be useful in developing social problem solving skills and emotion recognition, and expression in the self. Other studies (Bolte et al., 2002; Golan & Baron-Cohen, 2006; Hopkins, Gower, Perez, Smith, Amthor, Casey Wimsatt, & Biasini, 2011a; Lacava et al., 2007; 2010; Silver & Oakes, 2001; Thomeer et al., 2011; Weinger & Depue, 2011) have focused solely on emotion recognition in others, however having a full understanding of emotions involves being able to recognize emotions in the self as well as others.

As computers are less confronting than other methods of intervention (e.g., one-on-one teaching with Social Stories™). Therefore there is less of a barrier in confidence and motivation to participate by individuals with ASDs. Participants adapted and learnt quickly how to use the program. Therefore *AssistedMyFriendQuest* may even be used as a gateway in progression to using more confronting forms of

intervention. In addition, as illustrated in Tables 16 and 17, participants enjoyed, and learnt from *AssistedMyFriendQuest*.

Being a computer program, *MyFriendQuest* may also be less expensive, time-intensive, and resource intensive, than other interventions once children progress to be able to use the program on their own. In this study the researcher supported the participants for the first five sessions, then they were able to, for the majority of the time, use it without any input from the researcher. Therefore *AssistedMyFriendQuest* could be integrated into the classroom and used as a part of children's daily activities. A structured routine could be created around the use of *AssistedMyFriendQuest* whereby a schedule could be made to show children when they can use *AssistedMyFriendQuest* and a timer used to show how much time they have until they can use it and how much time they have left when using the program. It may also be used at home with minimal parental guidance and a similar schedule used. Since children become able to use *MyFriendQuest* on their own, tutors do not need to be employed. Parents and teachers have to put minimal time into supporting the child because of its short duration (20 minutes each session) and in addition to there being just a one-time fee when purchasing the program makes *AssistedMyFriendQuest* a cost-effective option for teaching emotional and social skills to children with ASDs. This is in stark contrast to interventions such as Social Stories™, video self-modeling, and ABA therapy, which require more resources. Because the manual for *MyFriendQuest* (Ahmad, 2009) is set out step-by-step, this enables the program to be implemented by a wide range of individuals, including parents and teachers.

AssistedMyFriendQuest could be used in conjunction with other therapy children may be receiving. For example with applied behaviour analysis techniques, children could be taught an emotion by a tutor, and then they could find the emotion

in *AssistedMyFriendQuest* and practice creating the emotion within the program and practice using it.

Implications for program development. There were a few instances during the later quarter of sessions where Hermione became bored of *AssistedMyFriendQuest*. Reinforcement (e.g., snacks, iPod Touch game) could be incorporated here for children whom require more motivation. As *AssistedMyFriendQuest* may become repetitive once children have mastered the emotions, a core focus of program development should be on ways to keep children interested. This could also be done through providing additional emotion packs to be available for download, and enhancing stimulating and motivating instructional aspects. Contingency management strategies may also help maintain interest, e.g., a mini game could be implemented which is offered to use every few emotions the child completes.

The feedback required by participants varies by ability, age, and skill targeted therefore the option to individualize feedback without tutor input would be desirable. When an emotion is completed in *MyFriendQuest*, a voice says "Well done", "Great", or "Excellent". More informative feedback could be more descriptive e.g., "Well done, a sad face is shown by droopy eyes and a turned down mouth". Children do eventually advance to being able to use the program independently, however the components which support generalization (e.g., emotion guessing game) cannot be used without a tutor. Support for further autonomy could be enhanced via incorporating independence through using facial recognition software. For example, provided a web camera is available, a *MyFriendQuest* character could ask the child to make a face e.g., happy and the software is able to detect whether the face is correct or not. In addition pictures of real life examples of emotions could be put into *AssistedMyFriendQuest* and the child asked to type or say what the emotion is (e.g.,

as used in *FaceSay* Sofronoff et al. (2005)). Videos illustrating social problem solving could be implemented as these have been shown to be effective in a prior study (Bolte et al., 2002). These suggestions could be used as the mini games suggested above to maintain interest and further support learning.

Implications for research. As this was the first time *AssistedMyFriendQuest* has been researched, there are a few implications for future research for the program. Harry appeared to choose incorrect answers at the same rate as he completed emotion scenarios. Harry required the researcher to read out the question and answer options for him. This is likely because he realized that he could keep trying different options until he got the correct answer to move onto the next emotion scenario. Repeated prompting by telling Harry to slow down and wait was often not successful. Harry was diagnosed with HFA whereas Ron and Hermione were diagnosed with AS and were able to read at a higher level than Harry. For example, Harry required assistance to read the text in *AssistedMyFriendQuest* whilst Ron and Hermione could do this by themselves. Therefore the ability of *AssistedMyFriendQuest* to improve social problem solving skills may be limited to higher functioning individuals. Future research should address whether *AssistedMyFriendQuest* is helpful for lower functioning individuals social problems solving skills.

In addition to addressing whether *AssistedMyFriendQuest* is helpful for lower functioning individuals, it should also be addressed whether *AssistedMyFriendQuest* is useful in treating other developmental or social disorders such as attention deficit hyperactivity disorder, anxiety disorders – in particular, social anxiety, depression, or even children who are shy.

There have been no other studies in computer interventions and to the researcher's knowledge any other method of intervention for ASDs, which have

incorporated a diary component. However it would seem logical to include one, as it would appear to be an easier step to make developing emotional expression skills by writing emotions down than expressing it out loud (for children with ASD), dependent on writing ability. This component also served in providing evidence of generalization of social problem solving, and contributed to emotional understanding of the self, other than just labeling emotions (emotion recognition) seen in *AssistedMyFriendQuest* in others. This evidence of generalization gives more credit to *AssistedMyFriendQuest* as an appropriate intervention as individuals with ASD have difficulty generalizing what is learnt in one context to another (Stokes & Baer, 1977). Therefore support for generalization of skill often needs to be programmed as seen with the multiple components in *AssistedMyFriendQuest*.

Since the participants appeared to prefer to play or read alone (e.g., Ron preferred to read in the library), - activities which provide little opportunity for social interaction - it may be better to set up roleplay group situations to get measures of social behaviours. Such research could also draw on the large research literature on social skills training (Cappadocia & Weiss, 2011; Tomeny & Barry, 2011; Walton & Ingersoll, 2013).

Due to the conflicting quantitative results noted in parent, teacher and participant interviews, it would be wise to review the way in which measures (e.g., SDQ) were used in the present study. As this was a single-subject design study these results were of little value in evaluating the effectiveness of *AssistedMyFriendQuest*. Perhaps in future studies, all interview items should be used over multiple interviews, or instead of asking for a quantitative rating, participants should be asked for a qualitative answer only.

Even though the importance of real-life practice of emotional and social skill training cannot be ignored, *AssistedMyFriendQuest* (or other computer-based interventions) are a less confronting starting point for individuals with ASDs, contributing to the building of emotional and social competence.

Limitations and Future Research Suggestions

A limitation affecting the reliability of this study was that the researcher was the only individual counting the diary words. To help improve this, words in each diary were counted several times to ensure accuracy. More importantly, as the researcher was the only individual counting the diary words they were also the only person counting the emotional words in the diary, which is to a certain level affected by to subjective judgment. However, the words counted as emotional words are displayed in the results, which give the best indication of the types of words considered to be emotion words. It would be desirable to have independent raters count and code diary words in future research.

As the observations were conducted at participant's schools, they were evaluated during interactions with familiar peers, therefore it is hard to say whether the learned social skills generalized to other settings with unfamiliar peers. However, there was some anecdotal evidence for Hermione and Harry that their social interactions had improved at after school activities. Although there was limited generalization, it was measured through multiple means (interviews with all informants, diary entries, naturalistic observation, components of *AssistedMyFriendQuest* e.g., expression guessing game). In addition generalization was still found after just six weeks. Future research should focus on how to make outcomes more consistent, and more durable and widely generalized.

In future studies, it may be better to have role play situations to observe some aspects of generalization. As it was, the behaviours participants engaged in the settings in which they were observed, provided little opportunity for the target behaviours to be used. Observations during the study revealed that Ron preferred to read alone in the library rather than play with others. Choosing to read alone in the library provided him with little opportunity to engage in the measured behaviours. Hermione was similar to Ron in that she spent the interval period inside the library reading or playing on the computers. She had short conversations with her peers. However as the study progressed she spent more and more time playing handball outside or playing on the playground. The observations revealed that there was a boy she would often talk to inside and outside of the library, and a group of children who she would play handball with. Harry would sometimes initiate conversation with peers during lunch time, these initiations included commenting on computer games others were playing beside him, telling others beside him to look at what he was doing on the computer or ask them a question about something on the computer. He was also observed to join in activities on his own in the playground and asked to sit with a group of boys. His peers co-operated with him well and took on a protective role with him, taking turns at looking after him. In future studies, setting up a role play situation with one or more typically developing peers may provide more information of the generalization of the target behaviours.

Unfortunately, the effect of the experimental training on Harry's lunchtime behaviour might have been influenced by a confounding variable, in that a system was implemented by his teacher aide as he had begun to have behaviour problems (pushing and shoving). In this system he wrote down on a sheet of paper before the beginning of each lunchtime who he wanted to play with, what he needed, what he wanted to do, and what the rules were. Changes in his social behaviour at lunchtime

might be a function of the computer training, the teacher aide system, acting separately or in combination, or due to some other factors. In addition during the latter half of sessions with Harry, he had been having some trouble with a girl who was trying to be friendly with him, but Harry found her to be annoying.

The design of the study limits the conclusions, which can be made about the effectiveness of *AssistedMyFriendQuest*. Threats to internal validity include intervention history for two participants. Within the last 12 months Ron and Harry had taken part in another computer intervention program teaching emotion recognition run by the government. This however, did not appear to give Ron and Harry superior results to Hermione. It is also difficult or near impossible to isolate which factors were responsible or most responsible for improvements e.g., which particular components of *AssistedMyFriendQuest* were most helpful. Therefore future studies using *AssistedMyFriendQuest* could also separate out the particular components which participants are exposed to in order to separate out which ones have the most effect, in order to facilitate program development. Also unknown is the extent to which researcher assistance and social interaction with the researcher had an impact. In future studies it would be interesting to train a peer tutor to use the program with participants. This could aid in fostering generalization and social relationships.

Although this study has an advantage over other computer-intervention studies, in that it included a follow-up period, it was short and ran only after 1-2 weeks post-training. Future studies should include follow-up periods after a longer length of time in order to better determine the persistence of any enhancement of social responsiveness and engagement.

Another limitation of the study affecting reliability was that the researcher was the only person undertaking the naturalistic observations. A threat to internal-validity

includes the observer-expectancy effect. The researcher could have been biased in looking for desirable results, however the results reflected are minor. Participants were also aware that they were being observed and as they had been told the study was on learning about emotions and friends, may have performed the behaviours the researcher expected to see (reactivity). The participants were unaware of the exact behaviours being measured however and the fact that participants were able to perform the behaviours is an example of social skill. While observations were limited to the school environment, there was evidence of social behaviours being extrapolated to environments outside of the school environment through parent report. Having two observers code a proportion of the observations is best practice in studies of this kind, as it permits inter-observer reliability to be computed.

It is not clear how the length of intervention is related to gains in emotional and social skills. The amount of training prescribed in this study was relatively frequent and participants made improvements in emotion recognition within the first few sessions. Nearing the end of the intervention participants were often able to complete all of the emotions within 20 minutes suggesting that 15-18 sessions is sufficient for the gains seen in this study. However it is not clear if participants continue to make gains months in advance. Future research could determine the ultimate dose of intervention for differing levels of ASD severity and incorporate longer follow-up periods

As this study included just three participants, the number of replications of the intervention effects are limited. Participants started the intervention at the same time, it would have been better for the study have been explicitly designed as a multiple baseline design. However, due to time constraints with the school year ending, this was not possible, and this was also the reason for the smaller number of participants. As ASD is a heterogeneous disorder the small number of participants is even more of

a limitation than may be for other disorders. This study included participants on a concentrated area of the ASD spectrum so there is a limited range of severity in which the findings apply to. However this study did include participants of three different ages, three different severity levels, and three different settings (training program (*AssistedMyFriendQuest*), school, and home) in addition to their being many measures in this study, this reduces the probability that findings were due to chance and unlikely that changes were due to maturation or other factors. In future research, the findings should be replicated systematically in different individuals so that more heterogeneity may be investigated.

In addition to there being a limited number of replications, this is the first time in which *AssistedMyFriendQuest* has been used in a study. Therefore findings have not been shown in any previous studies to support the use of *AssistedMyFriendQuest*. However, what is now shown is a successful pilot study, suggesting that further research should be done in the use of *AssistedMyFriendQuest* in teaching emotional and social skills. In addition to results of this study illustrating preliminary results, participants enjoyed using the program. The next section describes program acceptability data.

A test of generalization of emotion words in a future study could be to ask parents and teachers to note whether the children use emotion words not taught and taught more often in the natural environment. In addition *AssistedMyFriendQuest* could be used in a home setting, as well as in home and school to promote generalization to multiple settings. In addition, a method which could be used to unobtrusively obtain data would be to get audio recordings of conversations at meal times, as an example, and count the use of emotion words other evidence of social skills.

Conclusions

There are many intervention approaches with little or poor evidence bases (Ospina et al., 2008). The handful of computer-based interventions targeting emotional and social skills is growing, however few have replicated studies supporting their use. Based on previous research and the findings presented in this study, continued investigation of computer-based interventions including *AssistedMyFriendQuest*, using larger group studies across participants utilizing multiple-baseline designs, with longer term follow-up and over a wider range of functioning is justified. These studies should also include different settings. It is also worth researching whether *AssistedMyFriendQuest* is also a useful treatment for children with social anxiety, or depression. It could also be interesting to include a control group to compare how many emotion words typically developing children use, and over successive intervention sessions, how closely ASD children can approximate control children's use of emotion words.

In conclusion *AssistedMyFriendQuest* appears to be a promising treatment method to teach emotion recognition and social skills to children with ASDs as the characteristics of this technology align with the strengths and interests of such children. This is one of the very few computer intervention studies that has included tests of generalization and collected follow-up data. As generalization of social behaviours were limited and weaker in comparison to anecdotal evidence about improvement, future studies may benefit from making predictions and adapting measures guided by anecdotal evidence. For example, it was said by parents and teachers that participants began to participate more in group work, therefore a future study could undertake naturalistic observations from contrived group situations. The present study adds to the research base in computer interventions for ASDs and contributes to the increased understanding of available programs that may be used to

help. Although the findings are limited in the number of replications across participants, this study serves as a positive pilot.

Conflict of Interest Statement

The author declares no financial or other involvement with the software company ‘BrightMind LABS’.

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Appendices

Appendix A

Table 1

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
Silver & Oakes (2001)	22	10-18 years	ASD	*Emotion Trainer*	Emotion recognition	Improvements reached statistical significance in two sections of the intervention (t = 1.90, p = 0.045 and t = 3.37, p = 0.004). The experimental group improved significantly more than the control group in errors made on Emotion Recognition Cartoons (F = 4.785, p = 0.041) and on the Strange Stories score (F = 6.6881, p = 0.016). Both	Strengths: Improved ability to recog and predict emotions in others, there improving understanding of emotion states. The amount of improvement proportional to the number of times child used the program indicating po effects with repeated use. Limitations: Small sample size, shor intervention. Did not test to see if ch generalized to real life use.

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
						5.571, $p = 0.029$). The amount of times the intervention was used correlated with improvement in score on the Emotion Recognition Cartoons (*rho* = 0.511, $p = 0.015$) and Strange Stories (*rho* = 0.480, $p =$ 0.24).	
Bölte et al. (2002)	10	16-40 years	High functioning autism or Asperger syndrome	Interactive program using photographs of faces and eyes	Emotion recognition	There was a significant improvement in ability to read the mind in the face ($Z =$ 1.9, $p = .04$) and eyes-test ($Z = 2.1$, p =.03) by participants with high-functioning autism or Asperger syndrome.	Strengths: Increased participants abi recognize emotions. Demonstrated usefulness of a computer program to and teach the capacity of facial affe detection. Participants started imitat facial expressions, and showed sign enjoyment during the intervention. Limitations: Results did not general measures outside of the photograph the training program. Small sample

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
Golan & Baron-Cohen (2006)	Study 1: 65 Study 2: 39	Study 1: 17-52 years Study 2: 17-51 years	High functioning autism or Asperger syndrome	*Mind Reading: The Interactive Guide to Emotions*	Emotion recognition	The intervention group improve significantly from pre-to-post-test on all three measures: faces, t (17) = 5.37, p < .001; for voices, t (16) =5.24, p < .001; for concepts recognized: t (15) = 3.96, p < .005.	Strengths: The HFA/AS interventio group had a significant improvemer being able to recognize emotions fr faces and voices, and in the number emotion concepts recognized when with stimuli used in the training pro Confirmed the value of home use of program compared to the effect of g meetings. Demonstrated evidence fo close generalization of skill. Limitations: The control interventio not matched correctly with both tim curriculum. The group sizes were small. It was difficult for the participants t generalize what they had learnt to o tasks of emotion recognition from v and eyes. They also did not perform than controls on a task involving integration of facial, vocal and cont cues.

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
LaCava, Golan, Baron-Cohen, & Smith Myles (2007)	8	8-11 years	ASD	*Mind Reading: The Interactive Guide to Emotions*	Emotion Recognition	All three measures had statistically significant improvements: The Cambridge Mindreading Face–Voice Battery for Children (CAM-C) Faces subtest, $z = -2.366$, $p < .05$; the CAM-C Voices subtest, $z = 2.24$, $p < .05$; and The Child Feature- Based Auditory Task (C-FAT), $z = -2.028$, $p < .05$.	Strengths: Created improvements in emotion recognition from faces and voices; generalization to new voices program satisfaction. Findings sugg that Mind Reading shows potential a new tool for teaching emotion recognition. Improvements in emotion recognitic were extended to those faces and vo not included in the software indicati generalization. The study had replicated results in C & Baron-Cohen (2006). Students found the software fun and interesting. Limitations: Small sample size. Did include a typically developing contr group.
Hopkins et al. (2011)	49	6-15 years	Low functioning autism (25); high functioning autism (24)	*FaceSay*	Emotion recognition, facial recognition, social interactions	There was a significant difference in emotion recognition skills (photos and drawings) between children with LFA who received the intervention and those who did not, $F(1,21) = 4.52$, p	Strengths: The children with LFA demonstrated improvement in emoti recognition and social interactions, t children with HFA demonstrated improvements in facial recognition, emotion recognition and social inter in the natural environment. Children reported enjoying the computer prog Children increased their computer s Findings demonstrate support for th of computer games for enhancing sp

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
						< .05. In addition there was a significant difference between the groups when photos were just used as stimuli, $F(1,21) = 4.56$, $p < .05$. There was also significant differences in emotion recognition skills (photos and drawings), $F(1,20) = 29.31$, $p < .001$ in those with HFA. A difference was also found when only photos were used as stimuli $F(1,20) = 24.52$, $p < .001$, and when just drawings were used, $F(1, 20) = 15.48$, $p < .01$. Therefore only children with HFA improved their ability to identify emotions from drawings. Children	social skills. Limitations: It is not clear how the l of treatment is related to the effectiv of FaceSay. The study had a short-te follow-up but did not test for gains l on, for instance 6 months. The study not compare the computer-based pro with other treatments. Did not test to if the social skills generalized to oth settings with unfamiliar age peers. T observation rating scale did not asse frequency or duration of social skill

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
						with HFA improved their facial recognition skills as measured by the Benton Facial Recognition Test $F(1,20) = 10.86, p < .01$. Social skills also increased significantly for children with LFA as measured by the Social Skills Rating System $F(1, 21) = 14.42, p < .01$, and children with HFA also improved $F(1,20) = 4.36, p < .05$.	

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
Bernard-Opitz, Sriram & Nakhoda-Sapuan (2001)	16	4-8 years	ASD(8); typically developing (8)	Interactive program presenting social conflicts	Social understanding and problem solving	There were increases in the production of appropriate problem solving methods from baseline to intervention $F(3, 42) = 8.9$, $p < .001$.	Strengths: Results demonstrate that normal and autistic children can lea social problem solving via animated models of problem solutions throug computer. Observational data showe children with autism enjoyed the pr Limitations: Study did not assess generalization to real life settings or tests on problem solving.
Whalen, Liden, Ingersoll, Dallaire, & Liden (2006)	Study 1: 8 Study 2: 4	3-6 years	ASD (4); developmental disability (4)	*TeachTown*	Receptive language, social understanding, self-help, attention, memory, auditory processing, academic skills	There was a significant improvement in correct responses pre- to post-test, $t(7) = -4.06$, $p < .01$. During treatment children used more words per sentence ($M = 2.14$, $SE = .61$), than baseline ($M = 1.41$, $SE = .73$) or generalization sessions ($M = 1.83$, $SE = .81$).	Strengths: Improvements in appropr expressive language, receptive langu vocabulary and social understanding decreases in inappropriate language Children learned generalized concep Parents, special education teachers, clinicians gave high ratings to the program and showed a strong intere purchasing the program. In genreali play sessions half of the children increased their spontaneous comme and decreased their inappropriate language and behaviour. First progr provide an ABA program using soft and play-based activities.

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
							Limitations: Only a small portion of curriculum was assessed as well as j limited amount of time in the treatm program. Small sample size. It is no how much content learned in the ga generalized to real life.
Mitchell, Parsons, & Leonard (2007)	6	14-16 years	ASD	*Virtual Cafe*	Social understanding	Significant gains in social reasoning were more common following a virtual environment session than during a session that did not directly follow virtual environment McNemar χ^2 $(1, n = 19) = 7.58, p < .01$.	Strengths: Participants made improv in judgements and explanations abo where to sit in virtual environments. Showed that virtual environments ca used to teach social understanding. Experience in virtual environment l improvements in judgement and reasoning about where to sit in vide real cafes and buses. Those who sho most improvement in social understanding included those with t lowest verbal IQ scores. Limitations: Did not test for generalization, neither was their a fo up to see if improvement in social understanding was sustained. Unknown if it would be possible to virtual environments for teaching so understanding to those with lower I Small sample size.

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
Beaumont & Sofronoff (2008)	49	7.5-11 years	Asperger syndrome	*Junior Detective Training Program*	Social skills and social understanding	There was a significant improvement in scores on the Social Skill Questionnaire-parent (SSQ-P) version pre- to post-treatment for the treatment group $p <$ .002, $=\eta^2$ .54. A significant improvement was also found for the treatment group for the Emotion Regulation and Social Skills Questionnaire (ERSSQ) $p <$ .001, η^2 .57. There was a significant improvement in social skills rated by childrens teachers pre to post treatment as measured by the Social Skills Questionnnaire-	Strengths: Treatment group increase parent-reported social skills and knowledge of emotion-coping strate Treatment participants made greate improvements on the parent-report s skills measures and emotion-regulat measures than wait-list controls. Th results were also clinically meaning Improvements in social functioning maintained at 60week and 5-month follow-up. Limitations: The simple emotion-recognition measures to evaluate treatment outcomes were not sensiti enough to detect treatment effects. T small number of teacher respondent reduced the power to detect statistic significant effects and may have res in response bias.

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
						teacher (SSQ-T) version $F(1,18) = 38.50$, $p < .001$, $\eta^2 = .68$ There were significant improvements on the Facial Expression Recognition Measure, $F(1, 46) = 19.13$, $p < .001$, $\eta^2 .29$ and the Body Posture Recognition Measure, $F(1, 46) = 5.92$, $p < .02$ $\eta^2 = .11$. There was a significant improvement in the knowledge of emotion management strategies pre- to post-treatment *ps* < .001, $\eta^2 s > .35$.	
Whalen et al. (2010)	47	3-6 years	ASD; preschool-aged (24);	*TeachTown*	Receptive language, social understanding, self-	The treatment group had larger increases pre to post	Strengths: Preschool treatment grou made greater gains in receptive lang on Peabody Picture Vocabulary Tes

Description of Studies Using Computer-Based Interventions

Author(s)	N	Age	Participants	Intervention	Skills Targeted	Findings	Strengths/Limitations
			early elementary (23)		help, attention, memory, auditory processing, academic skills	intervention in raw Peabody Picture Vocabulary scores $F(1,21) = 5.03$, $p = 0.36$. The correlation between time spent in the TeachTown program and total number of lessons mastered was significant $r(22) = .53$, $p = .010$. The correlation between lessons mastered and the overall pre-post change on the Brigance was also significant $r(22) = .44$, $p = .042$.	control group. No significant differe in expressive language on Expressiv Vocabulary Test or overall develop between treatment and control grou either age group. Children in the *TeachTown: Basics* group performe better overall across all measures th children in the control group on standardized outcome measures. Th suggest that possibly the children w able to generalize the knowledge fr software to the assessments. Limitations: Small sample size. Not teachers followed the *TeachTown: B* curriculum and used the expert lesso instead where the teacher selected le for the student based on their perfor which made the variability in the dependent variables larger. The prog was only used for a small amount of which may have impacted the effica is unknown if the skills learnt gener to real life. Data was not recorded f maintenance over time.

Appendix B

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN ETHICS COMMITTEE
Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: 2012/22/ERHEC

4 July 2012

Elyse Wilson
Department of Psychology
UNIVERSITY OF CANTERBURY

Dear Elyse

Thank you for providing the revised documents in support of your application to the Educational Research Human Ethics Committee. I am very pleased to inform you that your research proposal "Teaching children about emotions and friends using a computer programme" has been granted ethical approval.

Please note that should circumstances relevant to this current application change you are required to reapply for ethical approval.

If you have any questions regarding this approval, please let me know. We wish you well for your research.

Yours sincerely

Nicola Surtees
Chair
Educational Research Human Ethics Committee

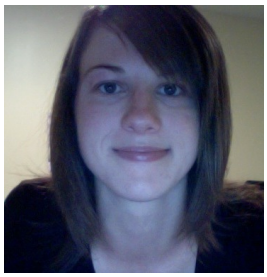
"Please note that Ethical Approval and/or Clearance relates only to the ethical elements of the relationship between the researcher, research participants and other stakeholders. The granting of approval or clearance by the Ethical Clearance Committee should not be interpreted as comment on the methodology, legality, value or any other matters relating to this research."

Appendix C

Telephone: +64 27 716 4638
Email : elyse.wilson@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

1 April 2012



Information Sheet for Schools

(To be discussed in a face to face meeting.)

Hi, I am a student studying for a Masters degree in psychology at the University of Canterbury. As part of my degree I am completing a thesis titled: Teaching Children About Emotions and Friends Using a Computer Program. The program requires a level 3 reading level and use of a mouse.

This study has received ethical approval from the University of Canterbury Educational Research Human Ethics Committee.

You are invited to nominate students in your school to participate in my study with learning needs in the area of emotions and friendships. Teachers, parents and children will give voluntary informed consent to participate in the study. Information recorded will be confidential; the names of the school, teacher and students will not be included in any published material. The schools involvement would be:

- Allowing me to bring my laptop into the classroom, library or other suitable space and use a computer program to teach emotions and social skills to the student(s). This will be 3-4 times a week for 15-45 minutes for 6 consecutive weeks depending on your school and class schedule (arranged with the teacher).

- I ask for permission to interview the student's teacher about the student(s) before and after the teaching session for approximately 30-60 minutes.

- I also ask for permission to observe the student(s) at lunchtime on 15 separate occasions for 20 minutes to collect information on how they play with their peers.

The potential benefits of these teaching sessions are:

- Students receive an additional 810 minutes in total of individual instruction designed to benefit their learning, at no additional financial cost.

- Teachers are supported by having their pupil participate in instruction at a time they feel would be best, so they can then use this time to work with other pupils.

If you agree to participate in my study, I would like to meet with teachers of the school to discuss the steps involved. If you do no not, please let me know.

You may contact myself, or one of my supervisors Verena Pritchard (+64 3 364 2987 ext:4201) and Kathleen Liberty (+64 3 364 2545 ext:6545) if you have any questions about the study at any stage. Elyse Wilson

Appendix D

Telephone: +64 27 716 4638
Email: elyse.wilson@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

1 April 2012

Information Sheet for Teachers

(To be discussed in a face to face meeting.)

Hi, I am a student studying for a Masters degree in psychology at the University of Canterbury. As part of my degree I am completing a thesis titled: Teaching Children About Emotions and Friends Using a Computer Program. The program requires a level 3 reading level and basic computer skills.

I would like to invite you and one or more of your pupils to participate in my study. In agreeing to participate I ask that you nominate the pupil(s) and send them an invitation. If the pupil and parent consent then I ask for your permission for me to do the following:

- Bring my laptop into your classroom and use a computer program to teach emotions and social skills to the student(s) providing assistance in addition to your school curriculum. This will be 3-4 times a week for 15-45 minutes for 6 consecutive weeks depending on your class schedule.

- Interview you about the student(s) before and after the teaching sessions for approximately 30-60 minutes.

- Observe the student(s) at lunchtime on 15 separate occasions for 20 minutes to collect information on how they play with their peers.

The potential benefits of this program are:

- Students receive an additional 810 minutes of individual instruction designed to benefit their learning, at no additional financial cost.

- Teachers are supported by having their pupil participate in instruction at a time they feel would be best, and, that they can then use this time to work with other pupils.

Your participation is voluntary; you have the right to withdraw at any time including the withdrawal of any information provided in the interview.

My supervisors Dr. Verena Pritchard and Associate Professor Kathleen Liberty and I will have access to the information collected from the study. I will take steps to ensure anonymity in publication of the findings in the thesis. All data will be stored in a locked facility at the University of Canterbury for five years. It will then be destroyed. A summary of the study will be posted to you within 18 months.

You may contact myself, or one of my supervisors Verena Pritchard (+64 3 364 2987 ext:4201) and Kathleen Liberty (+64 3 364 2545 ext:6545) if you have any questions about the study at any stage.

This study has received ethical approval from the University of Canterbury Educational

Research Human Ethics Committee. If you have any complaints about the study please contact The Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in this study, please complete the attached consent form and contact me. The next step will be to meet with me, I will show you the computer program and explain the steps involved in the study. From there I will ask you to contact the pupils who can benefit from these teaching sessions.

Elyse Wilson

Appendix E

Telephone: +64 27 716 4638
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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

1 April 2012

Teaching Children About Emotions and Friends Using a Computer Program

Consent Form for Teachers

I have been given a full explanation of this project and have been given an opportunity to ask questions.

I understand what will be required of me if I agree to take part in this project.

I understand that my participation is voluntary and that I may withdraw at any stage without penalty.

I understand that any information or opinions I provide will be kept confidential to the researcher and that any published or reported results will not identify me.

I understand that all data collected for this study will be kept in locked and secure facilities at the University of Canterbury and will be destroyed after five years.

I understand that I will receive a report on the findings of this study. I have provided my contact details below for this.

I understand that if I require further information I can contact the researcher, [name]. If I have any complaints, I can contact the Chair of the University of Canterbury Educational Research Human Ethics Committee.

By signing below, I agree to participate in this research project.

Name: _____

Date: _____

Signature: _____

Principal Signature: _____

Email address: _____

Please return this completed consent form to Elyse Wilson.

Appendix F

Telephone: +64 27 716 4638
Email: elyse.wilson@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

1 April 2012

Teaching Children About Emotions and Friends Using a Computer Program

Information Sheet for Parents (To be discussed on phone or in person.)

I am a student studying psychology at the University of Canterbury. I am interested in how technology can teach children about emotions and social skills. I would like to invite you and your child to participate in my study. If you agree to participate I ask that you allow me to do the following:

- Interview yourself, your child, and their teacher before and after the teaching sessions for approximately 30-60 minutes.
- Observe your child at lunchtime on 15 separate occasions for 20 minutes to collect information on play with their peers.
- Bring my laptop into your child's classroom and use a computer program to teach them about emotions and social skills, providing assistance in addition to their school curriculum. This will be 3-4 times a week for 15-45 minutes for 6 consecutive weeks depending on their school and class schedule. The timing of sessions will be discussed with your child's teacher so they do not miss out on any required classroom curriculum.
- Have your child keep a diary in the computer program about what has happened in their day and how they felt about it.

The potential benefits of this program are:

- Students receive an additional 810 minutes of individual instruction designed to benefit their learning, at no additional financial cost.
- Teachers are supported by having their pupil participate in instruction at a time they feel would be best, and, that they can then use this time to work with other pupils.

Please discuss these teaching sessions with your child to ensure that want to participate. Participation is voluntary; you have the right to withdraw yourself and your child at any time including the withdrawal of any information provided by you and/ or your child.

My supervisors Dr. Verena Pritchard and Associate Professor Kathleen Liberty and I will have access to the information collected from the study. I will take steps to ensure anonymity in publication of the findings in the thesis. All data will be stored in a locked facility at the University of Canterbury for five years. It will then be destroyed. You are able to request a report of the study by contacting me. You may contact myself, or one of my supervisors Verena Pritchard (+64 3 364 2987 ext:4201) and Kathleen Liberty (+64 3 364 2545 ext:6545) if you have any questions about the study at any stage.

This study has received ethical approval from the University of Canterbury Educational Research Human Ethics Committee. If you have any complaints about the study please contact The Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz). If you agree to participate in this study, please contact me. The next step will be for me to interview yourself and your child.

Appendix G

Telephone: +64 27 716 4638
Email: elyse.wilson@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

1 April 2012

Teaching Children About Emotions and Friends Using a Computer Program

Consent Form for Parents

I have been given a full explanation of this project and have been given an opportunity to ask questions.

I understand what will be required of me if I agree to take part in this project.

I understand that my participation is voluntary and that I may withdraw myself and my child at any stage without penalty.

I understand that any information or opinions I provide will be kept confidential to the researcher and that any published or reported results will not identify me.

I understand that all data collected for this study will be kept in locked and secure facilities at the University of Canterbury and will be destroyed after five years.

I understand that I will receive a report on the findings of this study. I have provided my email details below for this.

I understand that if I require further information I can contact the researcher, [name]. If I have any complaints, I can contact the Chair of the University of Canterbury Educational Research Human Ethics Committee.

By signing below, I agree to participate in this research project.

Name: _____ Name of Child: _____

Date: _____ Age: _____

Signature: _____ Name of Teacher: _____

Phone: _____ Name of School: _____

Postal Address: _____

Please return this completed consent form to Elyse Wilson.

Dear Parent,

I think your son/daughter could be interested in this opportunity.

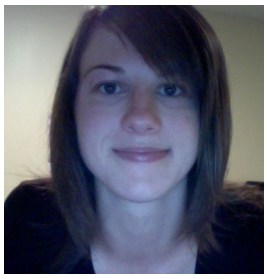
_____

(Teacher's Signature)

Research Involving a Computer Program about Emotions and Friends "AssistedMyFriendQuest"

This program involves 1 to 1 instruction within the classroom 3 times per week for 6 weeks. For more information please contact Elyse Wilson by telephone: +64 27 716 4638 or email: elyse.wilson@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND



Appendix H

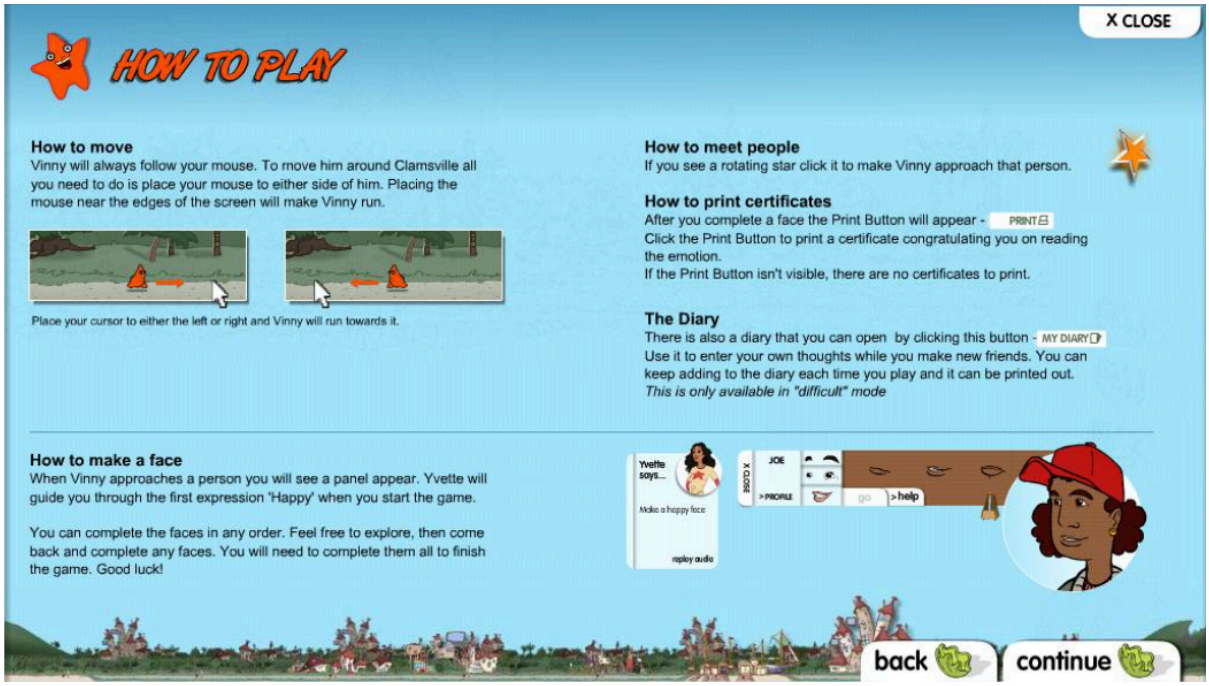


Figure 11. How to play *AssistedMyFriendQuest* (Ahmad, 2009)

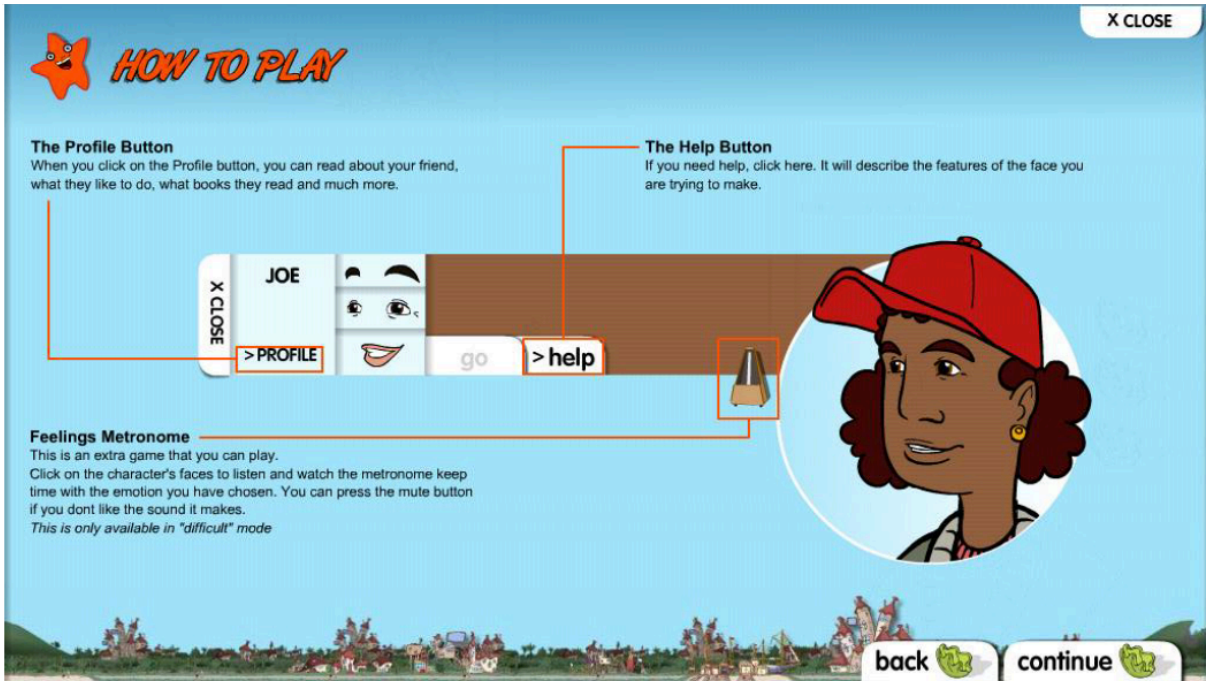


Figure 12. How to play *AssistedMyFriendQuest* (Ahmad, 2009)

Appendix I

Code Name:_____

Date: _____

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Parent Interview Before Teaching

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Parent Interview

The purpose of this interview is to gather information about your child before and after the teaching sessions to help us understand how the teaching program works. The questions are from standard questionnaires; you can choose to "skip" or "pass" any questions you do not wish to answer but your answers will help us evaluate the worth of this program for other children as well as your son/daughter.

Q.1. What hobbies/interests does your child have?

Q.2. What do you like to do together?

Q.3. What is your favourite thing about your child?

Q.4. Does he/she have any siblings?

Diagnostic Information

Q.5. What can you tell me about {SC}'s diagnosis?

Q.6. Who made the diagnosis? About how old was he/she at this time?

Q.7. Is {SC} currently on any medication? If so, type and dose. This is so we can understand if perhaps the teaching program is affected by the medication.

These next questions are from some standard questionnaires. Here is the card. Explain the card. Do you have any questions?

Social Communication

ANSWER CARD #1

Q.8. Over the past 6 months tell me which answer best describes whether {SC} has difficulty making friends, even when trying his or her best.

Q.9. Over the past 6 months tell me which answer best describes whether {SC} gets frustrated trying to get ideas across in conversations.

Q.10. Over the past 6 months tell me which answer best describes whether {SC} is able to imitate others' actions.

Q.11. Over the past 6 months tell me which answer best describes whether {SC} plays appropriately with children his or her age.

Q.12. Over the past 6 months tell me which answer best describes whether {SC} is socially awkward, even when he or she is trying to be polite.

Q.13. Over the past 6 months tell me which answer best describes whether {SC} has trouble keeping up with the flow of a normal conversation.

Q.14. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to adults.

Q.15. Over the past 6 months tell me which answer best describes whether {SC} is able to communicate his/her feelings to others.

Q.16. Over the past 6 months tell me which answer best describes whether {SC} is awkward in turn-taking interactions with peers (e.g.,, doesn't seem to understand the give-and-take of conversations).

Q.17. Over the past 6 months tell me which answer best describes whether {SC} avoids eye contact or has unusual eye contact.

Q.18. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to peers.

Q.19. Over the past 6 months tell me which answer best describes whether {SC} responds appropriately to mood changes in others (e.g.,, when a friend's or playmate's mood changes from happy to sad).

Q.20. Over the past 6 months tell me which answer best describes whether {SC} has overly serious facial expressions.

Q.21. Over the past 6 months tell me which answer best describes whether {SC} is too silly or laughs inappropriately.

Q.22. Over the past 6 months tell me which answer best describes whether {SC} has difficulty answering questions directly and ends up talking around the subject.

Q.23. Over the past 6 months tell me which answer best describes whether {SC} talks to people with an unusual tone of voice (e.g.,, talks like a robot or like he or she is giving a lecture).

Q.24. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is too close to someone or is invading someone's space.

Q.25. Over the past 6 months tell me which answer best describes whether {SC} is emotionally distant, doesn't show his or her feelings.

ANSWER CARD #2

Q.26. Over the past 6 months tell me which answer best describes whether {SC} is picked on or bullied by other children?

NO ANSWER CARD

Q.27. What is he/she like in group discussions?

Friends

Q.28. About how many close friends does your child have? (Do not include brothers and sisters).

None	1	2 or 3	4 or more

Q.29. About how many times a week does your child do things with any friends outside regular and friends outside regular school hours? (Do not include brothers and sisters).

Less than 1	1 or 2	3 or more

Q.30. Compared to other his/her age, how well does your child:

31a. Get along with his/her brothers and sisters?

Worse	Average	Better	Has no brothers or sisters

31b. Behave with his/her parents?

Worse	Average	Better

31c. Play and work along?

Worse	Average	Better

Q.32. Tell me about his/her ability to make friends.

ANSWER CARD #2

Q.33. Over the past 6 months tell me which answer best describes whether other children generally like {SC}?

Q.34. Over the past 6 months tell me which answer best describes whether {SC} is kind to younger children?

Q.35. Over the past 6 months tell me which answer best describes whether {SC} gets on better with adults than other children?

Behaviour

ANSWER CARD #2

Q.36. Over the past 6 months tell me which answer best describes whether overall, you think your child has difficulties in one or more of the following areas: emotions, concentration, behaviour, or trying to get along with other people?

No	Yes minor difficulties	Yes definite difficulties	Yes severe difficulties

If yes…

36b. How long have these difficulties been present?

Less than a month	1-5 months	6-12 months	Over a year

36c. Do these difficulties upset or distress your child?

Not at all	Only a little	Quite a lot	A great deal

36d.

i. Do these difficulties interfere with your child's everyday life in your **home life**?

ii. Do these difficulties interfere with your child's everyday life in their **friendships**?

iii. Do these difficulties interfere with your child's everyday life in their **classroom learning**?

iv. Do these difficulties interfere with your child's everyday life in their **leisure activities**?

Not at all	Only a little	Quite a lot	A great deal

36e. Do the difficulties put a burden on you or the family as a whole?

Not at all	Only a little	Quite a lot	A great deal

<u>Social Awareness</u>

ANSWER CARD #1

Q.37. Over the past 6 months tell me which answer best describes whether {SC} is aware of what others are thinking or feeling.

Q.38. Over the past 6 months tell me which answer best describes whether {SC} doesn't seem to mind being out of step with or "not on the same wavelength" as others.

Q.39. Over the past 6 months tell me which answer best describes whether {SC} has good personal hygiene.

Q.40. Over the past 6 months tell me which answer best describes whether {SC} focuses his or her attention to where others are looking or listening.

Q.41. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is talking too loud or making too much noise.

Q.42. Over the past 6 months tell me which answer best describes whether {SC} seems to react to people as if they are objects.

Q.43. Over the past 6 months tell me which answer best describes whether {SC} walks in between two people who are talking.

ANSWER CARD #2

Q.44. Over the past 6 months tell me which answer best describes whether {SC} is considerate of other people's feelings.

Social Motivation

ANSWER CARD #1

Q.45. Over the past 6 months tell me which answer best describes whether {SC} has good self-confidence.

Q.46. Over the past 6 months tell me which answer best describes whether {SC} does not join group activities unless told to do so.

Q.47. Over the past 6 months tell me which answer best describes whether {SC} avoids starting social interactions with peers or adults.

Q.48. Over the past 6 months tell me which answer best describes whether {SC} avoids people who want to be emotionally close to him or her.

Q.49. Over the past 6 months tell me which answer best describes whether {SC} clings to adults, and seems too dependent on them.

Q.50. Over the past 6 months tell me which answer best describes whether

{SC} seems much more fidgety in social situations than when alone.

Q.51. Over the past 6 months tell me which answer best describes whether expressions on {SC}'s face don't match what he/she is saying.

Q.52. Over the past 6 months tell me which answer best describes whether {SC} is too tense in social settings.

Q.53. Over the past 6 months tell me which answer best describes whether {SC} stares or gazes off into space.

ANSWER CARD #2

Q.54. Over the past 6 months tell me which answer best describes whether {SC} shares readily with other children (treats, toys, pencils etc.)?

Q.55. Over the past 6 months tell me which answer best describes whether {SC} is rather solitary and if he/she tends to play alone?

Q.56. Over the past 6 months tell me which answer best describes whether {SC} often volunteers to help others (parents, teachers, or other children)?

Social Cognition

ANSWER CARD #1

Q.57. Over the past 6 months tell me which answer best describes whether {SC} doesn't recognize when others are trying to take advantage of him/her.

Q.58. Over the past 6 months tell me which answer best describes whether {SC} takes things too literally and doesn't get the real meaning of a conversation.

Q.59. Over the past 6 months tell me which answer best describes whether {SC} is able to understand the meaning of other people's tone of voice and facial expressions.

Q.60. Over the past 6 months tell me which answer best describes whether {SC} recognizes when something is unfair.

Q.61. Over the past 6 months tell me which answer best describes whether {SC} is overly suspicious.

Q.62. Over the past 6 months tell me which answer best describes whether {SC} gives unusual or illogical reasons for doing things.

ANSWER CARD #2

Q.63. Over the past 6 months tell me which answer best describes whether {SC} is helpful if someone is hurt, upset or feeling ill?

Positive

NO ANSWER CARD

Q.64. What things have (socially) surprised you?

Q.65. What school related things have you been proud of?

Q.66. Can you tell me about a positive experience {SC} had with a friend?

Q.67. What achievements has {SC} made that have surprised you?

Q.68. What is {SC}'s best school subject?

Q.69. Tell me about a time when {SC} made you proud.

Q.70. What does {SC} like to do with others?

Thank you for your help, this information will be kept confidential. Do you have any you would like to add, ask or discuss? Or any questions about my study.

Show the parent the manifold book. This should be brought home in child's backpack each day. If your child isn't going to be at school on a day I am supposed to see them, please contact me on my cellphone.

Appendix J

Code Name:

Date:

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Before Teaching

Teacher Interview

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Teacher Interview

The purpose of this interview is to gather information about {SC} before and after the teaching sessions to help us understand how the teaching program works. The questions are from standard questionnaires; you can choose to "skip" or "pass" any questions you do not wish to answer but your answers will help us evaluate the worth of this program for other children as well as your student.

Q.1. What can you tell me about your teaching experiences so far with {SC}?

Q.2. What can you tell me about any previous experience with children with Autism or Asperger's Syndrome you may have had?

Q.3. What can you tell me about any training you may have had in working with children with Autism or Asperger's Syndrome?

These next questions are from some standard questionnaires. Here is the card. Explain the card. Do you have any questions?

Social Communication

ANSWER CARD

Q.4. Over the past 6 months tell me which answer best describes whether {SC} has difficulty making friends, even when trying his or her best.

Q.5. Over the past 6 months tell me which answer best describes whether {SC} gets frustrated trying to get ideas across in conversations.

Q.6. Over the past 6 months tell me which answer best describes whether {SC} is able to imitate others' actions.

Q.7. Over the past 6 months tell me which answer best describes whether {SC} plays appropriately with children his or her age.

Q.8. Over the past 6 months tell me which answer best describes whether {SC} is socially awkward, even when he or she is trying to be polite.

Q.9. Over the past 6 months tell me which answer best describes whether {SC} has trouble keeping up with the flow of a normal conversation.

Q.10. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to adults.

Q.11. Over the past 6 months tell me which answer best describes whether {SC} is able to communicate his/her feelings to others.

Q.12. Over the past 6 months tell me which answer best describes whether {SC} is awkward in turn-taking interactions with peers (e.g.,, doesn't seem to understand the give-and-take of conversations.

Q.13. Over the past 6 months tell me which answer best describes whether {SC} avoids eye contact or has unusual eye contact.

Q.14. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to peers.

Q.15. Over the past 6 months tell me which answer best describes whether {SC} responds appropriately to mood changes in others (e.g.,, when a friend's or playmate's mood changes from happy to sad).

Q.16. Over the past 6 months tell me which answer best describes whether {SC} has overly serious facial expressions.

Q.17. Over the past 6 months tell me which answer best describes whether {SC} is too silly or laughs inappropriately.

Q.18. Over the past 6 months tell me which answer best describes whether {SC} has difficulty answering questions directly and ends up talking around the subject.

Q.19. Over the past 6 months tell me which answer best describes whether {SC} talks to people with an unusual tone of voice (e.g.,, talks like a robot or like he or she is giving a lecture).

Q.20. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is too close to someone or is invading someone's space.

Q.21. Over the past 6 months tell me which answer best describes whether {SC} is emotionally distant, doesn't show his or her feelings.

Q.22. Is he/she picked on or bullied by other children?

NO ANSWER CARD

Q.23. What is he/she like in group discussions?

Friends

Q.24. About how many close friends does {SC} have? (Do not include brothers and sisters).

NO ANSWER CARD

Q.25. Compared to other his/her age, how well does {SC} play and work along?

Q.26. Tell me about his ability to make friends.

ANSWER CARD

Q.27. Over the past 6 months tell me which answer best describes whether other children generally like {SC}?

Q.28. Over the past 6 months tell me which answer best describes whether {SC} is kind to younger children?

Q.29. Over the past 6 months tell me which answer best describes whether {SC} gets on better with adults than other children?

Behaviour

Q.30a. Thinking about the following areas, emotions, concentration, behaviour, and/or trying to get along with other people.

Over the past 6 months, has your child had **none**, **minor**, **definite** or **severe difficulties**?

If yes…

30b. How long have these difficulties been present?

30c. Do these difficulties upset or distress the child?

30d.

i. Do these difficulties interfere with the child's everyday life in **peer relationships**?

ii. Do these difficulties interfere with the child's everyday life in **classroom learning**?

30e. Do the difficulties put a burden on you or the class as a whole?

Q.31. Tell me about {SC}'s behaviour and ability to participate in group discussions and activities.

Q.32. What do you find challenging about having {SC} in your class?

Social Awareness

ANSWER CARD

Q.33. Over the past 6 months tell me which answer best describes whether {SC} is aware of what others are thinking or feeling.

Q.34. Over the past 6 months tell me which answer best describes whether {SC} doesn't seem to mind being out of step with or "not on the same wavelength" as others.

Q.35. Over the past 6 months tell me which answer best describes whether {SC} has good personal hygiene.

Q.36. Over the past 6 months tell me which answer best describes whether {SC} focuses his or her attention to where others are looking or listening.

Q.37. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is talking too loud or making too much noise.

Q.38. Over the past 6 months tell me which answer best describes whether {SC} seems to react to people as if they are objects.

Q.39. Over the past 6 months tell me which answer best describes whether {SC} walks in between two people who are talking.

Q.40. Over the past 6 months tell me which answer best describes whether {SC} is considerate of other people's feelings?

Social Motivation

Q.41. Over the past 6 months tell me which answer best describes whether {SC} does not join group activities unless told to do so.

Q.42. Over the past 6 months tell me which answer best describes whether {SC} avoids starting social interactions with peers or adults.

Q.43. Over the past 6 months tell me which answer best describes whether {SC} avoids people who want to be emotionally close to him or her.

Q.44. Over the past 6 months tell me which answer best describes whether {SC} clings to adults, and seems too dependent on them.

Q.45. Over the past 6 months tell me which answer best describes whether {SC} seems much more fidgety in social situations than when alone.

Q.46. Over the past 6 months tell me which answer best describes whether expressions on {SC}'s face don't match what he/she is saying.

Q.47. Over the past 6 months tell me which answer best describes whether {SC} is too tense in social settings.

Q.48. Over the past 6 months tell me which answer best describes whether {SC} stares or gazes off into space.

Q.49. Over the past 6 months tell me which answer best describes whether {SC} shares readily with other children (treats, toys, pencils etc.)?

Q.50. Over the past 6 months tell me which answer best describes whether {SC} is rather solitary and do they tend to play alone?

Q.51. Over the past 6 months tell me which answer best describes whether they often volunteer to help others (parents, teachers, or other children)?

Social Cognition

Q.52. Over the past 6 months tell me which answer best describes whether {SC} doesn't recognize when others are trying to take advantage of him/her.

Q.53. Over the past 6 months tell me which answer best describes whether {SC} takes things too literally and doesn't get the real meaning of a conversation.

Q.54. Over the past 6 months tell me which answer best describes whether {SC} is able to understand the meaning of other people's tone of voice and facial expressions.

Q.55. Over the past 6 months tell me which answer best describes whether {SC} recognizes when something is unfair.

Q.56. Over the past 6 months tell me which answer best describes whether {SC} is overly suspicious.

Q.57. Over the past 6 months tell me which answer best describes whether {SC} gives unusual or illogical reasons for doing things.

Q.58. Over the past 6 months tell me which answer best describes whether {SC} is helpful if someone is hurt, upset or feeling ill?

Positive

Q.59. What things have surprised you about {SC}?

Q.60. Tell me about a positive experience {SC} has had in your class.

Thank you for your help, this information will be kept confidential. Do you have any you would like to add, ask or discuss? Or any questions about my study.

Show the teacher the manifold book. This should be brought home in child's backpack each day. If the child is going to be unavailable for some reason please contact me on my cellphone.

Appendix K

Code Name:

Date:

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Parent Interview After Teaching

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Post-Teaching Parent Interview

The purpose of this interview is to gather information about your child before and after the teaching sessions to help us understand how the teaching program works. The questions are from standard questionnaires; you can choose to "skip" or "pass" any questions you do not wish to answer but your answers will help us evaluate the worth of this program for other children as well as your son/daughter.

Q.1. Tell me about any changes you have noticed in {SC}'s behaviour.

Q.2. What influence do you think AssistedMyFriendQuest has had on {SC}'s ability to recognize emotions or in their social skills?

Q.3. What has {SC} told you about AssistedMyFriendQuest?

These next questions are from some standard questionnaires. Here is the card. Explain the card. Do you have any questions?

Social Communication

ANSWER CARD

Q.4. Over the past 6 months tell me which answer best describes whether {SC} has difficulty making friends, even when trying his or her best.

Q.5. Over the past 6 months tell me which answer best describes whether {SC} gets frustrated trying to get ideas across in conversations.

Q.6. Over the past 6 months tell me which answer best describes whether {SC} is able to imitate others' actions.

Q.7. Over the past 6 months tell me which answer best describes whether {SC} plays appropriately with children his or her age.

Q.8. Over the past 6 months tell me which answer best describes whether {SC} is socially awkward, even when he or she is trying to be polite.

Q.9. Over the past 6 months tell me which answer best describes whether {SC} has trouble keeping up with the flow of a normal conversation.

Q.10. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to adults.

Q.11. Over the past 6 months tell me which answer best describes whether {SC} is able to communicate his/her feelings to others.

Q.12. Over the past 6 months tell me which answer best describes whether {SC} is awkward in turn-taking interactions with peers (e.g.,, doesn't seem to understand the give-and-take of conversations).

Q.13. Over the past 6 months tell me which answer best describes whether {SC} avoids eye contact or has unusual eye contact.

Q.14. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to peers.

Q.15. Over the past 6 months tell me which answer best describes whether {SC} responds appropriately to mood changes in others (e.g.,, when a friend's or playmate's mood changes from happy to sad).

Q.16. Over the past 6 months tell me which answer best describes whether {SC} has overly serious facial expressions.

Q.17. Over the past 6 months tell me which answer best describes whether {SC} is too silly or laughs inappropriately.

Q.18. Over the past 6 months tell me which answer best describes whether {SC} has difficulty answering questions directly and ends up talking around the subject.

Q.19. Over the past 6 months tell me which answer best describes whether {SC} talks to people with an unusual tone of voice (e.g.,, talks like a robot or like he or she is giving a lecture).

Q.20. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is too close to someone or is invading someone's space.

Q.21. Over the past 6 months tell me which answer best describes whether {SC} is emotionally distant, doesn't show his or her feelings.

Q.22. Over the past 6 months tell me which answer best describes whether {SC} is picked on or bullied by other children?

NO ANSWER CARD

Q.23. What is he/she like in group discussions?

Friends

Q.24. About how many close friends does your child have? (Do not include brothers and sisters).

Q.25. About how many times a week does your child do things with any friends outside regular and friends outside regular school hours? (Do not include brothers and sisters).

Q.26. Compared to other his/her age, how well does your child:

26a. Get along with his/her brothers and sisters?

26b. Behave with his/her parents?

26c. Play and work along?

Q.27. Tell me about his/her ability to make friends.

ANSWER CARD

Q.28. Over the past 6 months tell me which answer best describes whether other children generally like {SC}?

Q.29. Over the past 6 months tell me which answer best describes whether {SC} is kind to younger children?

Q.30. Over the past 6 months tell me which answer best describes whether {SC} gets on better with adults than other children?

Behaviour

NO ANSWER CARD

Q.31. Thinking about the following areas, emotions, concentration, behaviour, and/or trying to get along with other people.

Over the past 6 months, has your child had **none**, **minor**, **definite** or **severe difficulties**?

If yes…

31b. How long have these difficulties been present?

31c. Do these difficulties upset or distress your child?

31d.

i. Do these difficulties interfere with your child's everyday life in your **home life**?

ii. Do these difficulties interfere with your child's everyday life in their **friendships**?

iii. Do these difficulties interfere with your child's everyday life in their **classroom learning**?

iv. Do these difficulties interfere with your child's everyday life in their **leisure activities**?

31e. Do the difficulties put a burden on you or the family as a whole?

Social Awareness

ANSWER CARD

Q.32. Over the past 6 months tell me which answer best describes whether {SC} is aware of what others are thinking or feeling.

Q.33. Over the past 6 months tell me which answer best describes whether {SC} doesn't seem to mind being out of step with or "not on the same wavelength" as others.

Q.34. Over the past 6 months tell me which answer best describes whether {SC} has good personal hygiene.

Q.35. Over the past 6 months tell me which answer best describes whether {SC} focuses his or her attention to where others are looking or listening.

Q.36. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is talking too loud or making too much noise.

Q.37. Over the past 6 months tell me which answer best describes whether {SC} seems to react to people as if they are objects.

Q.38. Over the past 6 months tell me which answer best describes whether

{SC} walks in between two people who are talking.

Q.39. Over the past 6 months tell me which answer best describes whether {SC} is considerate of other people's feelings.

Social Motivation

Q.40. Over the past 6 months tell me which answer best describes whether {SC} has good self-confidence.

Q.41. Over the past 6 months tell me which answer best describes whether {SC} does not join group activities unless told to do so.

Q.42. Over the past 6 months tell me which answer best describes whether {SC} avoids starting social interactions with peers or adults.

Q.43. Over the past 6 months tell me which answer best describes whether {SC} avoids people who want to be emotionally close to him or her.

Q.44. Over the past 6 months tell me which answer best describes whether {SC} clings to adults, and seems too dependent on them.

Q.45. Over the past 6 months tell me which answer best describes whether {SC} seems much more fidgety in social situations than when alone.

Q.46. Over the past 6 months tell me which answer best describes whether expressions on {SC}'s face don't match what he/she is saying.

Q.47. Over the past 6 months tell me which answer best describes whether {SC} is too tense in social settings.

Q.48. Over the past 6 months tell me which answer best describes whether {SC} stares or gazes off into space.

Q.49. Over the past 6 months tell me which answer best describes whether {SC} shares readily with other children (treats, toys, pencils etc.)?

Q.50. Over the past 6 months tell me which answer best describes whether {SC} is rather solitary and if he/she tends to play alone?

Q.51. Over the past 6 months tell me which answer best describes whether {SC} often volunteers to help others (parents, teachers, or other children)?

Social Cognition

Q.52. Over the past 6 months tell me which answer best describes whether {SC} doesn't recognize when others are trying to take advantage of him/her.

Q.53. Over the past 6 months tell me which answer best describes whether {SC} takes things too literally and doesn't get the real meaning of a conversation.

Q.54. Over the past 6 months tell me which answer best describes whether {SC} is able to understand the meaning of other people's tone of voice and facial expressions.

Q.55. Over the past 6 months tell me which answer best describes whether {SC} recognizes when something is unfair.

Q.56. Over the past 6 months tell me which answer best describes whether {SC} is overly suspicious.

Q.57. Over the past 6 months tell me which answer best describes whether {SC} gives unusual or illogical reasons for doing things.

Q.58. Over the past 6 months tell me which answer best describes whether {SC} is helpful if someone is hurt, upset or feeling ill?

Positive

NO ANSWER CARD

Q.59. What things have (socially) surprised you over the last 2 months?

Q.60. What school related things have you been proud over the last 2 months?

Thank you for your help, this information will be kept confidential. Do you have any you would like to add, ask or discuss? Or any questions about my study.

Appendix L

Code Name:

Date:

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

After Teaching
Teacher Interview

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Post-Teaching Teacher Interview

The purpose of this interview is to gather information about {SC} before and after the teaching sessions to help us understand how the teaching program works. The questions are from standard questionnaires; you can choose to "skip" or "pass" any questions you do not wish to answer but your answers will help us evaluate the worth of this program for other children as well as your student.

Q.1. Tell me about any changes you have noticed in {SC}'s behaviour.

Q.2. Tell me about {SC}'s behaviour and ability to participate in group discussions and activities.

Q.4. Has anything concerned you lately about {SC}?

Q.5. Have you made any observations about {SC} in the playground?

Q.6. Have you made any observations about {SC} in the classroom?

Q.7. Do you think that AssistedMyFriendQuest has had any influence on {SC}'s ability to recognize emotions or in their social skills?

These next questions are from some standard questionnaires. Here is the card. Explain the card. Do you have any questions?

<u>Social Communication</u>

ANSWER CARD

Q.8. Over the past 6 months tell me which answer best describes whether {SC} has difficulty making friends, even when trying his or her best.

Q.9. Over the past 6 months tell me which answer best describes whether {SC} gets frustrated trying to get ideas across in conversations.

Q.10. Over the past 6 months tell me which answer best describes whether {SC} is able to imitate others' actions.

Q.11. Over the past 6 months tell me which answer best describes whether

{SC} plays appropriately with children his or her age.

Q.12. Over the past 6 months tell me which answer best describes whether {SC} is socially awkward, even when he or she is trying to be polite.

Q.13. Over the past 6 months tell me which answer best describes whether {SC} has trouble keeping up with the flow of a normal conversation.

Q.14. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to adults.

Q.15. Over the past 6 months tell me which answer best describes whether {SC} is able to communicate his/her feelings to others.

Q.16. Over the past 6 months tell me which answer best describes whether {SC} is awkward in turn-taking interactions with peers (e.g.,, doesn't seem to understand the give-and-take of conversations.

Q.17. Over the past 6 months tell me which answer best describes whether {SC} avoids eye contact or has unusual eye contact.

Q.18. Over the past 6 months tell me which answer best describes whether {SC} has difficulty relating to peers.

Q.19. Over the past 6 months tell me which answer best describes whether {SC} responds appropriately to mood changes in others (e.g.,, when a friend's or playmate's mood changes from happy to sad).

Q.16. Over the past 6 months tell me which answer best describes whether {SC} has overly serious facial expressions.

Q.20. Over the past 6 months tell me which answer best describes whether {SC} is too silly or laughs inappropriately.

Q.21. Over the past 6 months tell me which answer best describes whether {SC} has difficulty answering questions directly and ends up talking around the subject.

Q.22. Over the past 6 months tell me which answer best describes whether {SC} talks to people with an unusual tone of voice (e.g.,, talks like a robot or like he or she is giving a lecture).

Q.23. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is too close to someone or is invading someone's space.

Q.24. Over the past 6 months tell me which answer best describes whether {SC} is emotionally distant, doesn't show his or her feelings.

Q.25. Is he/she picked on or bullied by other children?

NO ANSWER CARD

Q.26. What is he/she like in group discussions?

Friends

Q.27. About how many close friends does {SC} have? (Do not include brothers and sisters).

NO ANSWER CARD

Q.28. Compared to other his/her age, how well does {SC} play and work along?

Q.29. Tell me about his ability to make friends.

ANSWER CARD

Q.30. Over the past 6 months tell me which answer best describes whether other children generally like {SC}?

Q.31. Over the past 6 months tell me which answer best describes whether {SC} is kind to younger children?

Q.32. Over the past 6 months tell me which answer best describes whether {SC} gets on better with adults than other children?

Behaviour

Q.33a. Thinking about the following areas, emotions, concentration, behaviour, and/or trying to get along with other people.

Over the past 6 months, has the child had **none**, **minor**, **definite** or **severe difficulties**?

If yes…

34b. How long have these difficulties been present?

34c. Do these difficulties upset or distress the child?

34d.

i. Do these difficulties interfere with the child's everyday life in **peer relationships**?

ii. Do these difficulties interfere with the child's everyday life in **classroom learning**?

iii. Do the difficulties put a burden on you or the class as a whole?

Q.35. Tell me about {SC}'s behaviour and ability to participate in group discussions and activities.

Q.36. What do you find challenging about having {SC} in your class?

Social Awareness

ANSWER CARD

Q.37. Over the past 6 months tell me which answer best describes whether {SC} is aware of what others are thinking or feeling.

Q.38. Over the past 6 months tell me which answer best describes whether {SC} doesn't seem to mind being out of step with or "not on the same wavelength" as others.

Q.39. Over the past 6 months tell me which answer best describes whether {SC} has good personal hygiene.

Q.40. Over the past 6 months tell me which answer best describes whether

{SC} focuses his or her attention to where others are looking or listening.

Q.41. Over the past 6 months tell me which answer best describes whether {SC} knows when he or she is talking too loud or making too much noise.

Q.42. Over the past 6 months tell me which answer best describes whether {SC} seems to react to people as if they are objects.

Q.43. Over the past 6 months tell me which answer best describes whether {SC} walks in between two people who are talking.

Q.44. Over the past 6 months tell me which answer best describes whether {SC} is considerate of other people's feelings?

Social Motivation

Q.45. Over the past 6 months tell me which answer best describes whether {SC} does not join group activities unless told to do so.

Q.46. Over the past 6 months tell me which answer best describes whether {SC} avoids starting social interactions with peers or adults.

Q.47. Over the past 6 months tell me which answer best describes whether {SC} avoids people who want to be emotionally close to him or her.

Q.48. Over the past 6 months tell me which answer best describes whether {SC} clings to adults, and seems too dependent on them.

Q.49. Over the past 6 months tell me which answer best describes whether {SC} seems much more fidgety in social situations than when alone.

Q.50. Over the past 6 months tell me which answer best describes whether expressions on {SC}'s face don't match what he/she is saying.

Q.51. Over the past 6 months tell me which answer best describes whether {SC} is too tense in social settings.

Q.52. Over the past 6 months tell me which answer best describes whether {SC} stares or gazes off into space.

Q.53. Over the past 6 months tell me which answer best describes whether {SC} shares readily with other children (treats, toys, pencils etc.)?

Q.54. Over the past 6 months tell me which answer best describes whether

{SC} is rather solitary and do they tend to play alone?

Q.55. Over the past 6 months tell me which answer best describes whether they often volunteer to help others (parents, teachers, or other children)?

Social Cognition

Q.56. Over the past 6 months tell me which answer best describes whether {SC} doesn't recognize when others are trying to take advantage of him/her.

Q.57. Over the past 6 months tell me which answer best describes whether {SC} takes things too literally and doesn't get the real meaning of a conversation.

Q.58. Over the past 6 months tell me which answer best describes whether {SC} is able to understand the meaning of other people's tone of voice and facial expressions.

Q.59. Over the past 6 months tell me which answer best describes whether {SC} recognizes when something is unfair.

Q.60. Over the past 6 months tell me which answer best describes whether {SC} is overly suspicious.

Q.61. Over the past 6 months tell me which answer best describes whether {SC} gives unusual or illogical reasons for doing things.

Q.62. Over the past 6 months tell me which answer best describes whether {SC} is helpful if someone is hurt, upset or feeling ill?

Positive

Q.63. What things have surprised you about {SC} over the last 2 months?

Q.64. Tell me about a positive experience {SC} has had in your class in the last 2 months.

Thank you for your help, this information will be kept confidential. Do you have any you would like to add, ask or discuss? Or any questions about my study.

Appendix M

Code Name:

Date:

Teaching Children About Emotions and Friends Using a Computer Program

Pre-Teaching

Participant Interview

Day 1

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

First I am going to ask you about things you might like.

Q.1. What TV shows do you like?

Q.2. Do you like playing board games a lot?

Q.3. What do you like to do after school

ANSWER CARD #1

Now I am going to ask you some questions about your best friend.

Q.4. Who is your best friend?

Q.5. How is this friendship going?

Q.6. How happy are you with this friendship?

ANSWER CARD #2

The next two questions I am going to ask are about how you feel at school.

Q.7. Do you have nobody to talk to in class?

Q.8. Do you feel left out of things at school?

I am now going to ask you how you think and feel about yourself.

Q.9. Do you worry a lot of the time?

Q.10. Do you fear other people will laugh at you?

Q.11. Are you afraid to give a talk to your class?

Q.12. Do you get teased at school?

For the next few questions about your best friend I want you to tell me how true what I ask you, is about you and your friend.

Q.13. Do you talk to them when you're mad about something?

Q.14. Do you help each other with chores a lot?

Q.15. Do you do special favors for each other?

Q.16. Do you help each other with school work a lot?

Q.17. What happened at school today?

Q.18. What do you think about what happened?

Q.19. How did it make you feel?

Q.20. What did you do about it?

Q.21. Who helped you solve the problem?

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Code Name:

Date:

Teaching Children About Emotions and Friends Using a Computer Program

Pre-Teaching

Participant Interview

Day 2

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

ANSWER CARD #2

The first two questions I am going to ask are about how you feel at school.

Q.1. Is it hard for you to make friends at school?

Q.2. Is there no other kids you can go to when you need help in school?

NO ANSWER CARD

I am now going to ask you how you think and feel about yourself.

Q.3. Do you worry about what your parents will say to you?

Q.4. Do you get nervous when things do not go the right way for you?

Q.5. Are you afraid to speak up in a group?

Q.6. Do you sometimes say things you should not say?

The next few questions are about your best friend.

ANSWER CARD #2

Q.7. Do they get mad a lot?

Q.8. Do you fight a lot?

Q.9. Do you bug each other a lot?

Q.10. Do you get over your arguments really quickly?

Q.11. Do you always sit together at lunch?

Q.12. Do you always play together at recess?

Q.13. Do they tell you are good at things?

Q.14. Do you do fun things together a lot?

Q.15. Do you count on each other for good ideas on how to get things done?

Q.16. Do you tell each other secrets?

Q.17. What happened at school today?

Q.18. What do you think about what happened?

Q.19. How did it make you feel?

Q.20. What did you do about it?

Q.21. Who helped you solve the problem?

Awesome thanks for the chat, now let's play Angry Birds! Did you have any questions for me?

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Code Name:

Date:

Teaching Children About Emotions and Friends Using a Computer Program

Pre-Teaching

Participant Interview

Day 3

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

NO ANSWER CARD

I am now going to ask you how you think and feel about yourself.

Q.1. Do you worry that others will not like you?

Q.2. Do others seem to do things easier than you can?

Q.3. Do you feel bad if people laugh at you?

Q.4. Do you worry about what other people think about you?

Q.5. Do you worry about making mistakes in front of people?

Q.6. Do you worry about someone beating you up?

ANSWER CARD #2

Now I am going to ask you a couple of questions about school.

Q.7. Do you like school?

Q.8. Do you get along with other children in school?

The next few questions are about your best friend.

ANSWER CARD #2

Q.9. Do they care about your feelings?

Q.10. Do you argue a lot?

Q.11. Do they give advice with figuring things out?

Q.12. Do you share things with each other?

Q.13. Do they stick up for you if others talk behind your back?

Q.14. Do you always pick each other as partners for things?

Q.15. Do they say, "I'm sorry" if they hurt your feelings?

Q.16. Do you come up with good ideas on ways to do things?

Q.17. What happened at school today?

Q.18. What do you think about what happened?

Q.19. How did it make you feel?

Q.20. What did you do about it?

Q.21. Who helped you solve the problem?

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

Code Name:

Date:

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Pre-Teaching

Participant Interview

Day 4

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

ANSWER CARD #2

Q.1. Do you feel alone at school?

NO ANSWER CARD

I am now going to ask you how you think and feel about yourself.

Q.2. Do you get nervous around people?

Q.3. Do you worry about what is going to happen?

Q.4. Do you get angry sometimes?

Q.5. Are a lot of people against you?

Q.6. Do you worry about saying something dumb?

The next few questions are about your best friend.

ANSWER CARD #2

Q.7. Do they sometimes say mean things about you to other kids?

Q.8. Do they not listen to you?

Q.9. Would they like you even if others didn't?

Q.10. Can you count on each other to keep promises?

Q.11. Do they have good ideas about games to play?

Q.12. Do you talk about the things that make you both sad?

Q.13. Do you loan each other things all the time?

Q.14. What happened at school today?

Q.15. What do you think about what happened?

Q.16. How did it make you feel?

Q.17. What did you do about it?

Q.18. Who helped you solve the problem?

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Code Name:

Date:

Teaching Children About Emotions and Friends Using a Computer Program

Pre-Teaching

Participant Interview

Day 5

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Pre-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

ANSWER CARD #2

The next few questions I am going to ask are about how you feel at school.

Q.1 Is it hard to get kids in your school to like you?

Q.2. Are you lonely at school?

Q.3. Do you have any friends in class?

ANSWER CARD #2

I am now going to ask you how you think and feel about yourself.

Q.4. Do you feel someone will tell you, you do things the wrong way?

Q.5. Do you feel that others do not like the way you do things?

Q.6. Do you feel alone even when there are people with you?

Q.7. Are other people happier than you are?

Q.8. Do you worry about being called on in class?

The next few questions are about your best friend.

ANSWER CARD #2

Q.9. Do you make up easily when you have a fight?

Q.10. Do they make you feel good about your ideas?

Q.11. Do you go to each others' houses?

Q.12. Do they not tell others your secrets?

Q.13. Do they help you so you can get done quicker?

Q.14. Do you tell each other private things?

Q.15. Do you always tell each other about your problems?

Q.16. Do they tell you, you are pretty smart?

NO ANSWER CARD

Q.17. What is your favourite thing to do at school?

Q.18. What happened at school today?

Q.19. What do you think about what happened?

Q.20. How did it make you feel?

Q.21. What did you do about it?

Q.22. Who helped you solve the problem?

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

Appendix N

Code Name:

Date:

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Post-Teaching Participant Interview Day 1

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Post-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

First I am going to ask you a few questions about AssistedMyFriendQuest

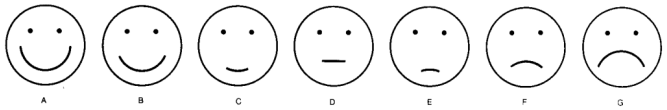
Q.1. What did you like about the program?

Q.2. What didn't you like about the program?

Q.3. Overall, how much did you like the program?

Not at all 0—1—2—3—4—5—6—7A lot

Q.4. How did you feel using the program?



Awesome the first section is over, have a sticker. Now I am going to ask you some questions about your best friend.

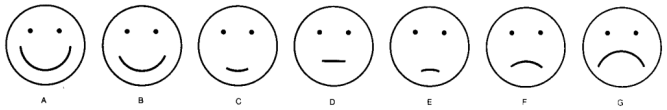
Q.4. Who is your best friend?

4.b. Why are they are your best friend?

Q.5. How is this friendship going?

5.b. Has this friendship improved since playing AssistedMyFriendQuest?

Q.6. How happy are you with this friendship?



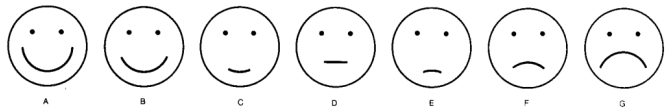
6.b. Can you tell me about a time when you were happy with your friend?

Awesome the second section is over, have a sticker. The next two questions I am going to ask are about how you feel at school.

Q.7. Who do you to talk to in class?

7.b. Why do you talk to them?

7.c. How do you feel when you talk to them?



7.d. How often do you talk to them?

Not at all 0—1—2—3—4—5—6—7A lot

Q.8. How much do you feel left out of things at school?

Not at all 0—1—2—3—4—5—6—7A lot

8.b. Why do you feel left out of these things?

8.c. Can you give me an example of a time when you felt left out?

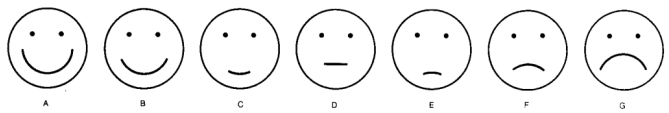
Awesome the third section is over, have a sticker. I am now going to ask you how you think and feel about yourself.

Q.9. How much do you worry?

Not at all 0—1—2—3—4—5—6—7A lot

9.b. What sorts of things do you worry about?

9.c. How do you feel when you worry?



Q.10. How much do you fear other people will laugh at you?

Not at all 0—1—2—3—4—5—6—7A lot

10.b. What do you do when you feel like this?

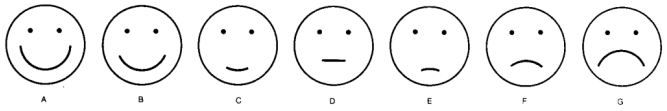
Q.11. How afraid are you to give a talk to your class?

Not at all 0—1—2—3—4—5—6—7A lot

Q.12. How often do you get teased at school?

Not at all 0—1—2—3—4—5—6—7A lot

12.b. How does this make you feel?



12.c. What do you do about it?

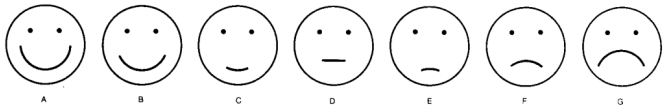
Awesome the fourth section is over, have a sticker. For the next few questions about your best friend I want you to tell me how true what I ask you, is about you and your friend.

Q.13. How often do you talk to them when you're mad about something?

Not at all 0—1—2—3—4—5—6—7A lot

13.b. Can you give me an example?

13.c. How do you feel when you get mad?



Q.14. How much do you help each other with chores?

Not at all 0—1—2—3—4—5—6—7A lot

14.b. What sorts of chores do they help you with?

Q.15. How often do you do special favors for each other?

Not at all 0—1—2—3—4—5—6—7A lot

15.b. What sorts of favors do they help you with?

Q.16. How often do you help each other with school work?

Not at all 0—1—2—3—4—5—6—7A lot

Q.17. What happened at school today?

Q.18. What do you think about what happened?

Q.19. How did it make you feel?

Q.20. What did you do about it?

Q.21. Who helped you solve the problem?

Awesome the fifth section is over, take a sticker. Now I am going to ask you about your day.

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Post-Teaching Participant Interview Day 2

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Post-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

The first few questions are about AssistedMyFriendQuest.

Q.1. What did you learn using from AssistedMyFriendQuest?

Q.2. Do you feel that you ability to recognize emotions has improved since using AssistedMyFriendQuest?

Not at all 0—1—2—3—4—5—6—7A lot

Q.3. Do you feel that your social skills have improved since using AssistedMyFriendQuest?

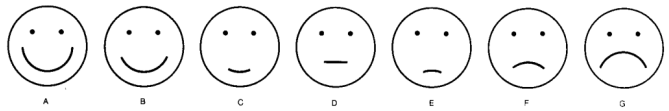
Not at all 0—1—2—3—4—5—6—7A lot

Awesome the first section is over, I am now going to ask are about how you feel at school.

Q.4. Is it hard for you to make friends at school?

4.b. What do you find hard about it?

4.c. How do you feel when trying to make friends?



Q.5. Who in your class can you go to when you need help in school?

5.b. How often do you ask them for help?

Not at all 0—1—2—3—4—5—6—7A lot

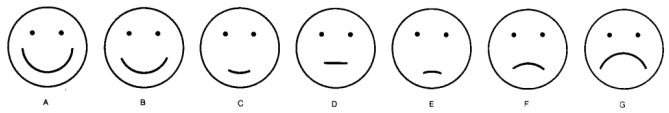
Awesome the second section is over, take a sticker. I am now going to ask you how you think and feel about yourself.

Q.6. How much do you worry about what your parents will say to you?

Not at all 0—1—2—3—4—5—6—7A lot

6.b. What kinds of things do you worry that they will say?

6.c. How does it make you feel?



Q.7. How nervous do you get when things do not go the right way for you?

7.b. How often does this happen?

Not at all 0—1—2—3—4—5—6—7A lot

Q.8. How afraid are you to speak up in a group?

8.b. Why are you afraid?

8.c. What do you do when you are afraid?

Q.9. How often do you sometimes say things you should not say?

Not at all 0—1—2—3—4—5—6—7A lot

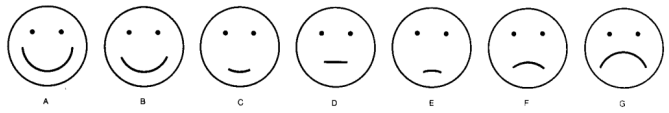
9.b. Can you give me an example?

Awesome the third section is over, have a sticker. The next few questions are about your best friend.

Q.10. How often do they get mad?

Not at all 0—1—2—3—4—5—6—7A lot

10.b. How do you feel when they get mad?



Q.11. How often do you fight?

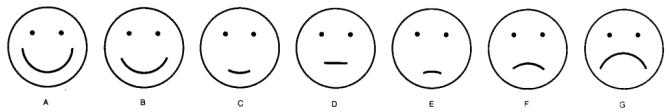
Not at all 0—1—2—3—4—5—6—7A lot

Q.12. How often do you bug each other?

Not at all 0—1—2—3—4—5—6—7A lot

13.b. What sorts of things do you bug each other about?

14.c. How do you feel when you bug each other?



Q.15. How quickly do you get over your arguments?

Q.16. How often do you sit together at interval or lunch?

Not at all 0—1—2—3—4—5—6—7A lot

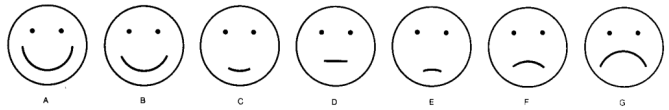
Q.17. How often do you play together at interval or lunch?

Not at all 0—1—2—3—4—5—6—7A lot

Q.18. How often do they tell you are good at things?

Not at all 0—1—2—3—4—5—6—7A lot

18.b. How does this make you feel?



Q.19. How often do you do fun things together?

Not at all 0—1—2—3—4—5—6—7A lot

19.b. What sorts of fun things do you do together?

Q.20. How much do you count on each other for good ideas on how to get things done?

Not at all 0—1—2—3—4—5—6—7A lot

Q.21. How often do you tell each other secrets?

Not at all 0—1—2—3—4—5—6—7A lot

Awesome, the fourth section is over, take a sticker. Now I am going to ask you some questions about your day.

Q.22. What happened at school today?

Q.23. What do you think about what happened?

Q.24. How did it make you feel?

Q.25. What did you do about it?

Q.26. Who helped you solve the problem?

Awesome, the fifth section is over, take a sticker. Now I am going to ask you some questions about your day.

Awesome thanks for the chat, now let's play Angry Birds! Did you have any questions for me?

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

Code Name:

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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Post-Teaching Participant Interview Day 3

Elyse Wilson is completing this interview as a part of a study for a master's degree

Post-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

First I am going to ask you some questions about AssistedMyFriendQuest

Q.1. What has changed about your relationships with your classmates since playing AssistedMyFriendQuest?

Q.2. What do you think we could have done for you to have learnt more from AssistedMyFriendQuest?

Q.3. What about AssistedMyFriendQuest did you find the most helpful?

Awesome, the first section is over, have a sticker. Now I am going to ask you how you think and feel about yourself.

Q.4. How much do you worry that others will not like you?

Not at all 0—1—2—3—4—5—6—7A lot

4.b. Why do you worry that others will not like you?

4.c. How do you feel when you worry that others will not like you?

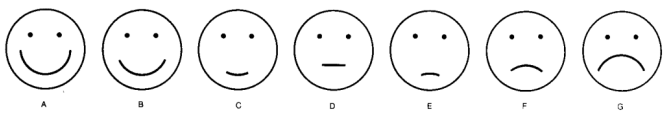
4.d. How often do you worry that others will not like you?

Not at all 0—1—2—3—4—5—6—7A lot

Q.5. Are there any things you can't do as easily as other people?

5.b. Can you give me any examples?

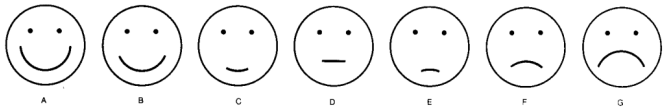
5.c. How do you feel when you can't do something as easily as someone else?



5.d. How often does this happen?

Not at all 0—1—2—3—4—5—6—7A lot

Q.6. If people laugh at you, how do you feel?



6.b. What do you do when people laugh at you?

6.c. How often does this happen?

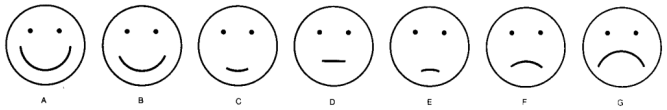
Not at all 0—1—2—3—4—5—6—7A lot

Q.7. How much do you worry about what other people think about you?

Not at all 0—1—2—3—4—5—6—7A lot

7.b. What do you think they thinking about you?

7.c. How does this make you feel?

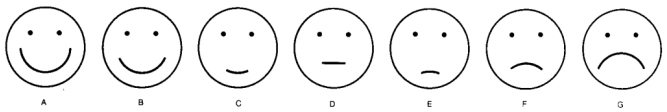


Q.8. How much do you worry about making mistakes in front of people?

Not at all 0—1—2—3—4—5—6—7A lot

8.b. What kinds of mistakes do you worry about making?

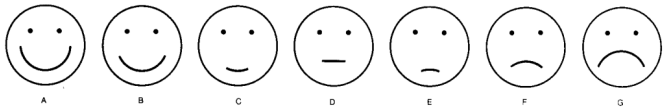
8.c. How do you feel when you make a mistake?



Q.9. How much do you worry about someone beating you up?

Not at all 0—1—2—3—4—5—6—7A lot

9.b. How do you feel when you are worried about this?



9.c. Has this ever happened? If so how often?

Not at all 0—1—2—3—4—5—6—7A lot

Awesome the second section is over, take a sticker. Now I am going to ask you a couple of questions about school.

Q.10. How much do you like school?

Not at all 0—1—2—3—4—5—6—7A lot

10.b. What about school do you like?

10.c. What don't you like about school?

Q.11. How well do you get along with other children in school?

Awesome the third section is over, take a sticker. The next few questions are about your best friend.

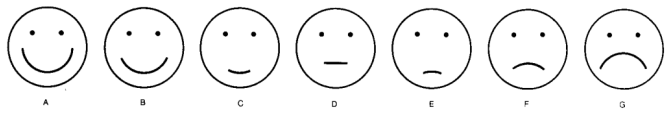
Q.12. Please tell me about a time when you knew that they cared about your feelings?

Q.13. How much do you argue with your friend?

Not at all 0—1—2—3—4—5—6—7A lot

14.b. What kinds of things do you argue about?

14.c. How do you feel when you argue with your friend?



Q.15. What sort of advice do they give you?

15.b. How often do they give you advice?

Not at all 0—1—2—3—4—5—6—7A lot

Q.16. What sort of things do you share with each other?

Q.17. How often do they stick up for you if others talk behind your back?

Not at all 0—1—2—3—4—5—6—7A lot

Q.18. How often do you always pick each other as partners for things?

Not at all 0—1—2—3—4—5—6—7A lot

Q.19. How often do they say, "I'm sorry" if they hurt your feelings?

Not at all 0—1—2—3—4—5—6—7A lot

Q.20. How often do you come up with good ideas on ways to do things?

Not at all 0—1—2—3—4—5—6—7A lot

Awesome the fourth section is over, take a sticker. The next few questions are about your day.

Q.21. What happened at school today?

Q.22. What do you think about what happened?

Q.23. How did it make you feel?

Q.24. What did you do about it?

Q.25. Who helped you solve the problem?

Awesome the fifth section is over, take a sticker.

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Post-Teaching Participant Interview Day 4

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Post-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

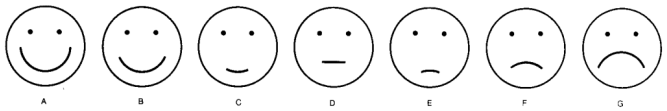
The first few questions I am going to ask you are about how you think and feel about yourself.

Q.1. How often do you feel alone at school?

Not at all 0—1—2—3—4—5—6—7A lot

1.b. Can you give me an example of when you have felt alone and what you did about it?

Q.2. How nervous do you get around people?



2.b. Can you give me an example?

Q.3. How much do you worry about what is going to happen?

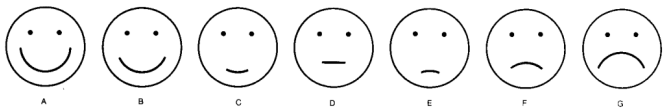
Not at all 0—1—2—3—4—5—6—7A lot

3.b. Can you give me an example of what you think might happen?

Q.4. How often do you get angry?

Not at all 0—1—2—3—4—5—6—7A lot

4.b. How do you feel when you get angry?



Q.5. How much do you think people against you?

Not at all 0—1—2—3—4—5—6—7A lot

Q.6. How much do you worry about saying something dumb?

Not at all 0—1—2—3—4—5—6—7A lot

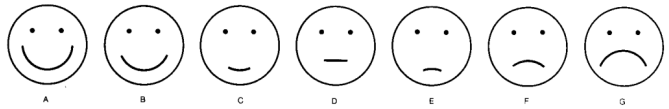
6.b. Has this ever happened, and what did you do about it?

Awesome the first section is over, choose a sticker. The next few questions are about your best friend.

Q.7. How often do they say mean things about you to other kids?

Not at all 0—1—2—3—4—5—6—7A lot

7.b. How does it make you feel when they do this?



7.c. Can you give me an example, and what you did about it?

Q.8. How often do they not listen to you?

Not at all 0—1—2—3—4—5—6—7A lot

Q.9. How much do you think they would like you even if others didn't?

Not at all 0—1—2—3—4—5—6—7A lot

Q.10. How much can you count on each other to keep promises?

Not at all 0—1—2—3—4—5—6—7A lot

Awesome the third section is over, choose a sticker.

Q.11. How often do they have good ideas about games to play?

Not at all 0—1—2—3—4—5—6—7A lot

Q.12. How often do you talk about the things that make you both sad?

Not at all 0—1—2—3—4—5—6—7A lot

12.b. What sorts of things make you both sad?

Q.13. How often do you loan each other things?

Not at all 0—1—2—3—4—5—6—7A lot

Awesome the fourth section is over, choose a sticker. The next few questions are about your day.

Q.14. What happened at school today?

Q.15. What do you think about what happened?

Q.16. How did it make you feel?

Q.17. What did you do about it?

Q.18. Who helped you solve the problem?

Awesome the fifth section is over, choose a sticker.

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

Code Name:

Date:

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Teaching Children About Emotions and Friends Using a Computer Program

Post-Teaching Participant Interview Day 5

Elyse Wilson is completing this interview as a part of a study for a master's degree.

Post-Teaching Participant Interview

I am interviewing you to find out more about you. I will ask you a few questions each day for five days. Then you get to play a game on my computer. If you do not want to answer a question I ask, you can say "skip" or "pass". You can ask me questions too.

The first few questions I am going to ask are about how you feel at school.

Q.1 How hard is it to get kids at your school to like you?

Q.2. Tell me about the friends you have in class.

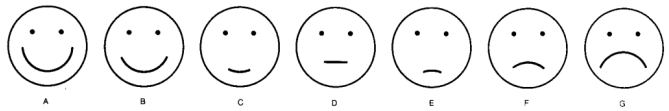
Awesome the first section is over, choose a sticker. I am now going to ask you how you think and feel about yourself.

Q.3. How often do you feel someone will tell you that you are doing something the wrong way?

Not at all 0—1—2—3—4—5—6—7A lot

3.b. Can you give me an example of a time when this happened?

3.c. How did it make you feel?



Q.4. How much do you feel that others do not like the way you do things?

Not at all 0—1—2—3—4—5—6—7A lot

Q.5. How often do you feel alone even when there are people with you?

Not at all 0—1—2—3—4—5—6—7A lot

Q.6. How much do you feel that other people happier than you are?

Not at all 0—1—2—3—4—5—6—7A lot

6.b. Why do you feel this way?

Q.7. How often do you worry about being called on in class?

Not at all 0—1—2—3—4—5—6—7A lot

Awesome, the second section is over choose a sticker. The next few questions are about your best friend.

Q.8. How easily do you make up after you have a fight?

8.b. Can you give me an example of a time when you had a fight and how you made up?

Q.9. How often do they make you feel good about your ideas?

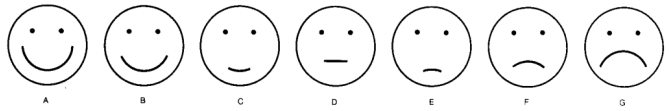
Not at all 0—1—2—3—4—5—6—7A lot

Q.10. How often do you go to each others' houses?

Q.11. How often do they tell others your secrets?

Not at all 0—1—2—3—4—5—6—7A lot

11.b. How does it make you feel if they do tell others your secrets?



Q.12. How often do they help you so you can get done quicker?

Not at all 0—1—2—3—4—5—6—7A lot

12.b. Can you give me an example of when they have helped you?

Awesome the third section is over, choose a sticker.

Q.13. How often do you tell each other private things?

Not at all 0—1—2—3—4—5—6—7A lot

Q.14. How often do you tell each other about your problems?

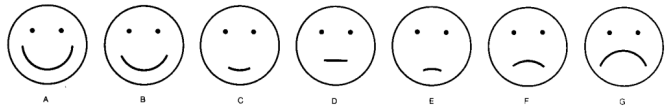
Not at all 0—1—2—3—4—5—6—7A lot

Q.15. How often do they tell you, you are pretty smart?

Not at all 0—1—2—3—4—5—6—7A lot

15.b. Can you give me an example?

15.c. How does it make you feel when they say this?



Q.16. What is your favourite thing to do at school?

Awesome the fourth section is over, have a sticker. Now I am going to ask you about your day.

Q.17. What happened at school today?

Q.18. What do you think about what happened?

Q.19. How did it make you feel?

Q.20. What did you do about it?

Q.21. Who helped you solve the problem?

Awesome the fifth section is over, choose a sticker.

Awesome thanks for the chat, now let's play Angry Birds! Think about some questions you might like to ask me next time.

REMINDER

- Let participant know when I am seeing them next.
- Fill out manifold sheet and give to them.

Appendix O

Items Included from the RCMAS-2

Social Anxiety

I fear other people will laugh at me.

I am afraid to give a talk to my class.

I get teased at school.

A lot of people are against me.

I feel someone will tell me I do things the wrong way.

I feel that others do not like the way I do things.

I feel alone even when there are people with me.

Other people are happier than I am.

I worry about being called on in class.

Others seem to do things easier than I can.

I fear other people will laugh at me.

Worry

I worry a lot of the time.

I worry about what my parents will say to me.

I sometimes say things I should not say.

I worry that others do not like me.

I worry about what other people think about me.

I worry about making mistakes in front of people.

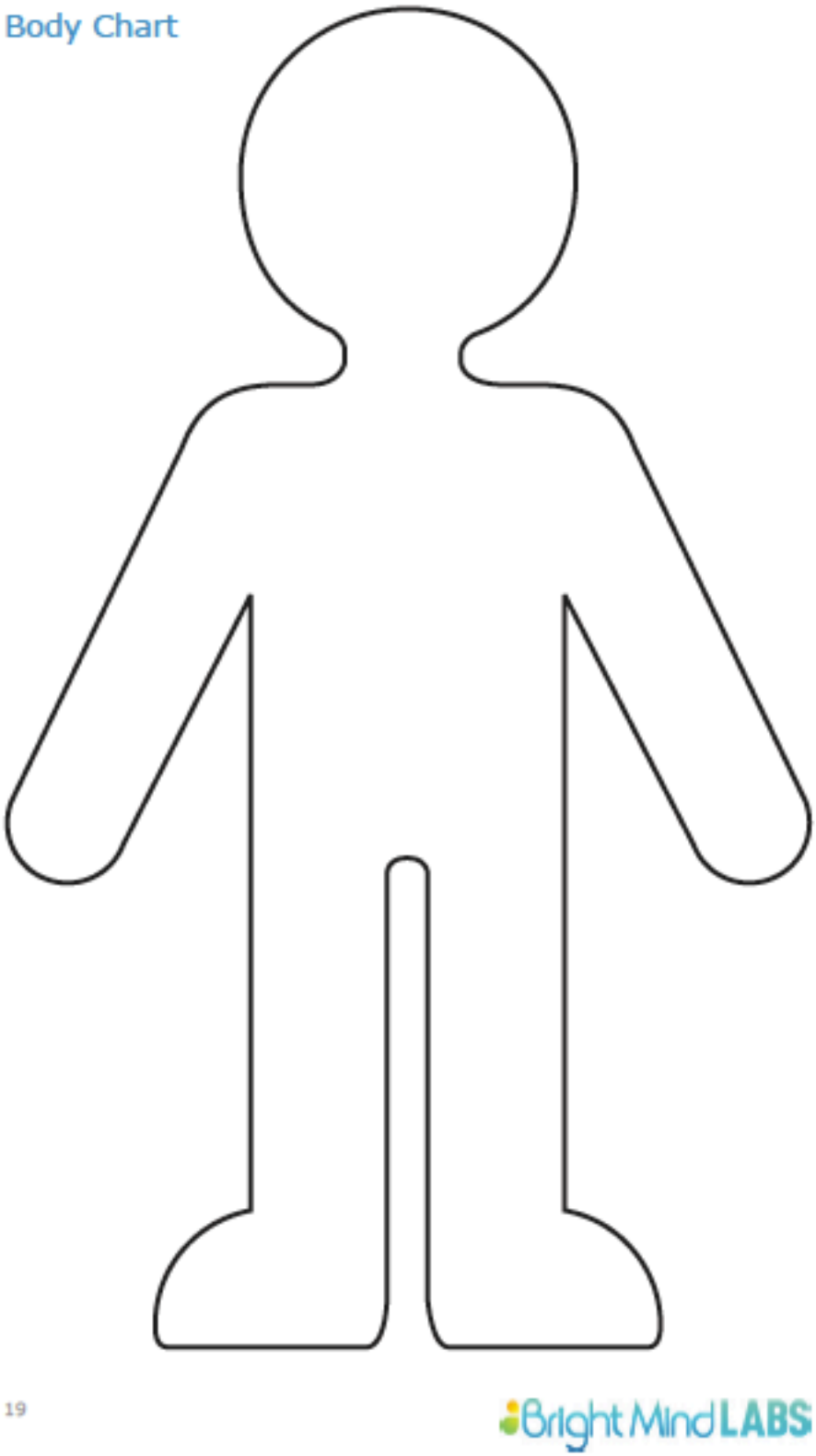
I worry about someone beating me up.

I get nervous around people.

I worry about what is going to happen.

I worry about saying something dumb.

Appendix P



Appendix Q

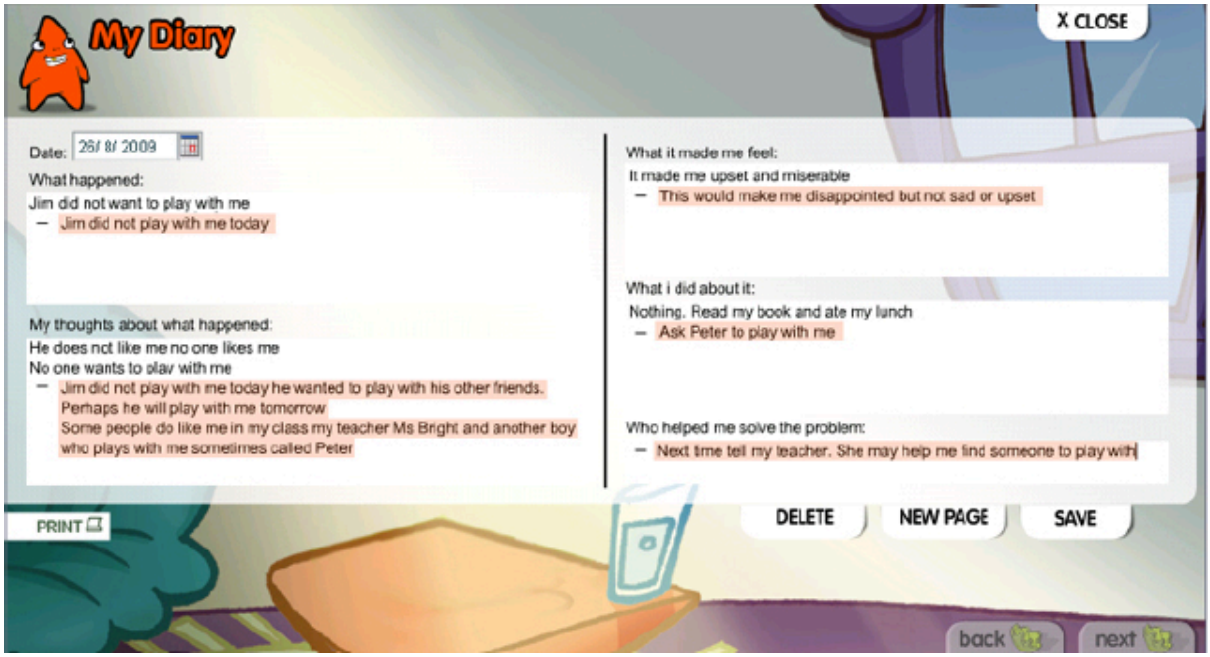


Figure 3. Diary used in AssistedMyFriendQuest (Ahmad, 2009).